

SEQUENCE LISTING

<110> THE GOVERNMENT OF THE UNITED STATES OF AMERICA AS
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<120> RECOMBINANT HUMAN METAPNEUMOVIRUS AND ITS USE

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<151> 2003-02-28

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<160> 36

<170> PatentIn version 3.2

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 <211> 14083
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> HMPV strain 83 with GFP inserted prior to N gene.

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| catcatggaa taatatggaa atagttggag taacatctcc tagcatcaat acatgtatgg | 11340 |
| atgtcatata tgcaactagt tctcatttga aaggataat tatagaaaag ttcagcactg | 11400 |
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<211> 187

<212> PRT

<213> human metapneumovirus

<400> 4

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Arg | Lys | Ala | Pro | Cys | Lys | Tyr | Glu | Val | Arg | Gly | Lys | Cys | Asn |
| 1 | | | | | | | | | 10 | | | | | 15 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Gly | Ser | Glu | Cys | Lys | Phe | Asn | His | Asn | Tyr | Trp | Ser | Trp | Pro | Asp |
| 20 | | | | | | | | | 25 | | | | 30 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Tyr | Leu | Leu | Ile | Arg | Ser | Asn | Tyr | Leu | Leu | Asn | Gln | Leu | Leu | Arg |
| 35 | | | | | | | | | 40 | | | 45 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asn | Thr | Asp | Arg | Ala | Asp | Gly | Leu | Ser | Ile | Ile | Ser | Gly | Ala | Gly | Arg |
| 50 | | | | | | | | | 55 | | | 60 | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Glu | Asp | Arg | Thr | Gln | Asp | Phe | Val | Leu | Gly | Ser | Thr | Asn | Val | Val | Gln |
| 65 | | | | | | | | 70 | | | 75 | | 80 | | |

| | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Tyr | Ile | Asp | Asp | Asn | Gln | Ser | Ile | Thr | Lys | Ala | Ala | Cys | Tyr |
| 85 | | | | | | | | 90 | | | | | 95 | |

Ser Leu His Asn Ile Ile Lys Gln Leu Gln Glu Val Glu Val Arg Gln
100 105 110

Ala Arg Asp Ser Lys Leu Ser Asp Ser Lys His Val Ala Leu His Asn
115 120 125

Leu Ile Leu Ser Tyr Met Glu Met Ser Lys Thr Pro Ala Ser Leu Ile
130 135 140

Asn Asn Leu Lys Arg Leu Pro Arg Glu Lys Leu Lys Lys Leu Ala Lys
145 150 155 160

Leu Ile Ile Asp Leu Ser Ala Gly Ala Asp Asn Asp Ser Ser Tyr Ala
165 170 175

Leu Gln Asp Ser Glu Ser Ile Asn Gln Val Gln
180 185

<210> 5

<211> 179

<212> PRT

<213> human metapneumovirus

<400> 5

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Thr His Leu Lys Lys Ile Ile Lys Asp His Ser Gly Lys Val Leu Ile
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Ala Leu Lys Leu Ile Leu Ala Leu Leu Thr Phe Phe Thr Ile Thr Ile
35 40 45

Thr Ile Asn Tyr Ile Lys Val Glu Asn Asn Leu Gln Ile Cys Gln Ser
50 55 60

Lys Thr Glu Ser Asp Lys Glu Asp Ser Pro Ser Asn Thr Thr Ser Val
65 70 75 80

Thr Thr Lys Thr Thr Leu Asp His Asp Ile Thr Gln Tyr Phe Lys Arg
85 90 95

Leu Ile Gln Arg Tyr Thr Asp Ser Val Ile Asn Lys Asp Thr Cys Trp
100 105 110

Lys Ile Ser Arg Asn Gln Cys Thr Asn Ile Thr Thr Tyr Lys Phe Leu

115

120

125

Cys Phe Lys Pro Glu Asp Ser Lys Ile Asn Ser Cys Asp Arg Leu Thr
130 135 140

Asp Leu Cys Arg Asn Lys Ser Lys Ser Ala Ala Glu Ala Tyr His Thr
145 150 155 160

Val Glu Cys His Cys Ile Tyr Thr Ile Glu Trp Lys Cys Tyr His His
165 170 175

Ser Ile Asp

<210> 6

<211> 219

<212> PRT

<213> human metapneumovirus

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Met Glu Val Lys Val Glu Asn Ile Arg Ala Ile Asp Met Leu Lys Ala
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Arg Val Lys Asn Arg Val Ala Arg Ser Lys Cys Phe Lys Asn Ala Ser
20 25 30

Leu Ile Leu Ile Gly Ile Thr Thr Leu Ser Ile Ala Leu Asn Ile Tyr
35 40 45

Leu Ile Ile Asn Tyr Thr Ile Gln Lys Thr Ser Ser Glu Ser Glu His
50 55 60

His Thr Ser Ser Pro Pro Thr Glu Ser Asn Lys Glu Ala Ser Thr Ile
65 70 75 80

Ser Thr Asp Asn Pro Asp Ile Asn Pro Asn Ser Gln His Pro Thr Gln
85 90 95

Gln Ser Thr Glu Asn Pro Thr Leu Asn Pro Ala Ala Ser Val Ser Pro
100 105 110

Ser Glu Thr Glu Pro Ala Ser Thr Pro Asp Thr Thr Asn Arg Leu Ser
115 120 125

Ser Val Asp Arg Ser Thr Ala Gln Pro Ser Glu Ser Arg Thr Lys Thr
130 135 140

Lys Pro Thr Val His Thr Arg Asn Asn Pro Ser Thr Ala Ser Ser Thr
145 150 155 160

Gln Ser Pro Pro Arg Ala Thr Thr Lys Ala Ile Arg Arg Ala Thr Thr
165 170 175

Phe Arg Met Ser Ser Thr Gly Lys Arg Pro Thr Thr Thr Ser Val Gln
180 185 190

Ser Asp Ser Ser Thr Thr Thr Gln Asn His Glu Glu Thr Gly Ser Ala
195 200 205

Asn Pro Gln Ala Ser Val Ser Thr Met Gln Asn
210 215

<210> 7
<211> 2005
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<213> human metapneumovirus

<400> 7

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Tyr Leu Lys Gly Val Ile Ser Phe Ser Glu Thr Asn Ala Ile Gly Ser
20 25 30

Cys Leu Leu Lys Arg Pro Tyr Leu Lys Asn Asp Asn Thr Ala Lys Val
35 40 45

Ala Ile Glu Asn Pro Val Ile Glu His Val Arg Leu Lys Asn Ala Val
50 55 60

Asn Ser Lys Met Lys Ile Ser Asp Tyr Lys Val Val Glu Pro Val Asn
65 70 75 80

Met Gln His Glu Ile Met Lys Asn Val His Ser Cys Glu Leu Thr Leu
85 90 95

Leu Lys Gln Phe Leu Thr Arg Ser Lys Asn Ile Ser Thr Leu Lys Leu
100 105 110

Asn Met Ile Cys Asp Trp Leu Gln Leu Lys Ser Thr Ser Asp Asp Thr
115 120 125

Ser Ile Leu Ser Phe Ile Asp Val Glu Phe Ile Pro Ser Trp Val Ser
130 135 140

Asn Trp Phe Ser Asn Trp Tyr Asn Leu Asn Lys Leu Ile Leu Glu Phe
145 150 155 160

Arg Arg Glu Glu Val Ile Arg Thr Gly Ser Ile Leu Cys Arg Ser Leu
165 170 175

Gly Lys Leu Val Phe Ile Val Ser Ser Tyr Gly Cys Ile Val Lys Ser
180 185 190

Asn Lys Ser Lys Arg Val Ser Phe Phe Thr Tyr Asn Gln Leu Leu Thr
195 200 205

Trp Lys Asp Val Met Leu Ser Arg Phe Asn Ala Asn Phe Cys Ile Trp
210 215 220

Val Ser Asn Ser Leu Asn Glu Asn Gln Glu Gly Leu Gly Leu Arg Ser
225 230 235 240

Asn Leu Gln Gly Met Leu Thr Asn Lys Leu Tyr Glu Thr Val Asp Tyr
245 250 255

Met Leu Ser Leu Cys Cys Asn Glu Gly Phe Ser Leu Val Lys Glu Phe
260 265 270

Glu Gly Phe Ile Met Ser Glu Ile Leu Arg Ile Thr Glu His Ala Gln
275 280 285

Phe Ser Thr Arg Phe Arg Asn Thr Leu Leu Asn Gly Leu Thr Asp Gln
290 295 300

Leu Thr Lys Leu Lys Asn Lys Asn Arg Leu Arg Val His Ser Thr Val
305 310 315 320

Leu Glu Asn Asn Asp Tyr Pro Met Tyr Glu Val Val Leu Lys Leu Leu
325 330 335

Gly Asp Thr Leu Arg Cys Ile Lys Leu Leu Ile Asn Lys Asn Leu Glu
340 345 350

Asn Ala Ala Glu Leu Tyr Tyr Ile Phe Arg Ile Phe Gly His Pro Met
355 360 365

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Asp | Glu | Arg | Asp | Ala | Met | Asp | Ala | Val | Lys | Leu | Asn | Asn | Glu | Ile |
| 370 | | | | | | | | | | | | | | | 380 |
| | | | | | | | | | | | | | | | |
| Thr | Lys | Ile | Leu | Arg | Leu | Glu | Ser | Leu | Thr | Glu | Leu | Arg | Gly | Ala | Phe |
| 385 | | | | | | | | | | | | | | | 400 |
| | | | | | | | | | | | | | | | |
| Ile | Leu | Arg | Ile | Ile | Lys | Gly | Phe | Val | Asp | Asn | Asn | Lys | Arg | Trp | Pro |
| 405 | | | | | | | | | | | | | | | 415 |
| | | | | | | | | | | | | | | | |
| Lys | Ile | Lys | Asn | Leu | Lys | Val | Leu | Ser | Lys | Arg | Trp | Thr | Met | Tyr | Phe |
| 420 | | | | | | | | | | | | | | | 430 |
| | | | | | | | | | | | | | | | |
| Lys | Ala | Lys | Asn | Tyr | Pro | Ser | Gln | Leu | Glu | Leu | Ser | Glu | Gln | Asp | Phe |
| 435 | | | | | | | | | | | | | | | 445 |
| | | | | | | | | | | | | | | | |
| Leu | Glu | Leu | Ala | Ala | Ile | Gln | Phe | Glu | Gln | Glu | Phe | Ser | Val | Pro | Glu |
| 450 | | | | | | | | | | | | | | | 460 |
| | | | | | | | | | | | | | | | |
| Lys | Thr | Asn | Leu | Glu | Met | Val | Leu | Asn | Asp | Lys | Ala | Ile | Ser | Pro | Pro |
| 465 | | | | | | | | | | | | | | | 480 |
| | | | | | | | | | | | | | | | |
| Lys | Arg | Leu | Ile | Trp | Ser | Val | Tyr | Pro | Lys | Asn | Tyr | Leu | Pro | Glu | Thr |
| 485 | | | | | | | | | | | | | | | 495 |
| | | | | | | | | | | | | | | | |
| Ile | Lys | Asn | Arg | Tyr | Leu | Glu | Glu | Thr | Phe | Asn | Ala | Ser | Asp | Ser | Leu |
| 500 | | | | | | | | | | | | | | | 510 |
| | | | | | | | | | | | | | | | |
| Lys | Thr | Arg | Arg | Val | Leu | Glu | Tyr | Tyr | Leu | Lys | Asp | Asn | Lys | Phe | Asp |
| 515 | | | | | | | | | | | | | | | 525 |
| | | | | | | | | | | | | | | | |
| Gln | Lys | Glu | Leu | Lys | Ser | Tyr | Val | Val | Arg | Gln | Glu | Tyr | Leu | Asn | Asp |
| 530 | | | | | | | | | | | | | | | 540 |
| | | | | | | | | | | | | | | | |
| Lys | Glu | His | Ile | Val | Ser | Leu | Thr | Gly | Lys | Glu | Arg | Glu | Leu | Ser | Val |
| 545 | | | | | | | | | | | | | | | 560 |
| | | | | | | | | | | | | | | | |
| Gly | Arg | Met | Phe | Ala | Met | Gln | Pro | Gly | Lys | Gln | Arg | Gln | Ile | Gln | Ile |
| 565 | | | | | | | | | | | | | | | 575 |
| | | | | | | | | | | | | | | | |
| Leu | Ala | Glu | Lys | Leu | Leu | Ala | Asp | Asn | Ile | Val | Pro | Phe | Phe | Pro | Glu |
| 580 | | | | | | | | | | | | | | | 590 |
| | | | | | | | | | | | | | | | |
| Thr | Leu | Thr | Lys | Tyr | Gly | Asp | Leu | Asp | Leu | Gln | Arg | Ile | Met | Glu | Ile |
| 595 | | | | | | | | | | | | | | | 605 |

Lys Ser Glu Leu Ser Ser Ile Lys Thr Arg Arg Asn Asp Ser Tyr Asn
610 615 620

Asn Tyr Ile Ala Arg Ala Ser Ile Val Thr Asp Leu Ser Lys Phe Asn
625 630 635 640

Gln Ala Phe Arg Tyr Glu Thr Thr Ala Ile Cys Ala Asp Val Ala Asp
645 650 655

Glu Leu His Gly Thr Gln Ser Leu Phe Cys Trp Leu His Leu Ile Val
660 665 670

Pro Met Thr Thr Met Ile Cys Ala Tyr Arg His Ala Pro Pro Glu Thr
675 680 685

Lys Gly Glu Tyr Asp Ile Asp Lys Ile Glu Glu Gln Ser Gly Leu Tyr
690 695 700

Arg Tyr His Met Gly Gly Ile Glu Gly Trp Cys Gln Lys Leu Trp Thr
705 710 715 720

Met Glu Ala Ile Ser Leu Leu Asp Val Val Ser Val Lys Thr Arg Cys
725 730 735

Gln Met Thr Ser Leu Leu Asn Gly Asp Asn Gln Ser Ile Asp Val Ser
740 745 750

Lys Pro Val Lys Leu Ser Glu Gly Leu Asp Glu Val Lys Ala Asp Tyr
755 760 765

Arg Leu Ala Val Lys Met Leu Lys Glu Ile Arg Asp Ala Tyr Arg Asn
770 775 780

Ile Gly His Lys Leu Lys Glu Gly Glu Thr Tyr Ile Ser Arg Asp Leu
785 790 795 800

Gln Phe Ile Ser Lys Val Ile Gln Ser Glu Gly Val Met His Pro Thr
805 810 815

Pro Ile Lys Lys Val Leu Arg Val Gly Pro Trp Ile Asn Thr Ile Leu
820 825 830

Asp Asp Ile Lys Thr Ser Ala Glu Ser Ile Gly Ser Leu Cys Gln Glu
835 840 845

Leu Glu Phe Arg Gly Glu Ser Ile Ile Val Ser Leu Ile Leu Arg Asn
850 855 860

Phe Trp Leu Tyr Asn Leu Tyr Met His Glu Ser Lys Gln His Pro Leu
865 870 875 880

Ala Gly Lys Gln Leu Phe Lys Gln Leu Asn Lys Thr Leu Thr Ser Val
885 890 895

Gln Arg Phe Phe Glu Ile Lys Arg Glu Asn Glu Val Val Asp Leu Trp
900 905 910

Met Asn Ile Pro Met Gln Phe Gly Gly Gly Asp Pro Val Val Phe Tyr
915 920 925

Arg Ser Phe Tyr Arg Arg Thr Pro Asp Phe Leu Thr Glu Ala Ile Ser
930 935 940

His Val Asp Ile Leu Leu Lys Ile Ser Ala Asn Ile Lys Asn Glu Thr
945 950 955 960

Lys Val Ser Phe Phe Lys Ala Leu Leu Ser Ile Glu Lys Asn Glu Arg
965 970 975

Ala Thr Leu Thr Thr Leu Met Arg Asp Pro Gln Ala Val Gly Ser Glu
980 985 990

Arg Gln Ala Lys Val Thr Ser Asp Ile Asn Arg Thr Ala Val Thr Ser
995 1000 1005

Ile Leu Ser Leu Ser Pro Asn Gln Leu Phe Ser Asp Ser Ala Ile
1010 1015 1020

His Tyr Ser Arg Asn Glu Glu Glu Val Gly Ile Ile Ala Glu Asn
1025 1030 1035

Ile Thr Pro Val Tyr Pro His Gly Leu Arg Val Leu Tyr Glu Ser
1040 1045 1050

Leu Pro Phe His Lys Ala Glu Lys Val Val Asn Met Ile Ser Gly
1055 1060 1065

Thr Lys Ser Ile Thr Asn Leu Leu Gln Arg Thr Ser Ala Ile Asn
1070 1075 1080

Gly Glu Asp Ile Asp Arg Ala Val Ser Met Met Leu Glu Asn Leu
1085 1090 1095

Gly Leu Leu Ser Arg Ile Leu Ser Val Val Val Asp Ser Ile Glu
1100 1105 1110

Ile Pro Ile Lys Ser Asn Gly Arg Leu Ile Cys Cys Gln Ile Ser
1115 1120 1125

Arg Thr Leu Arg Glu Thr Ser Trp Asn Asn Met Glu Ile Val Gly
1130 1135 1140

Val Thr Ser Pro Ser Ile Thr Thr Cys Met Asp Val Ile Tyr Ala
1145 1150 1155

Thr Ser Ser His Leu Lys Gly Ile Ile Ile Glu Lys Phe Ser Thr
1160 1165 1170

Asp Arg Thr Thr Arg Gly Gln Arg Gly Pro Lys Ser Pro Trp Val
1175 1180 1185

Gly Ser Ser Thr Gln Glu Lys Lys Leu Val Pro Val Tyr Asn Arg
1190 1195 1200

Gln Ile Leu Ser Lys Gln Gln Arg Glu Gln Leu Glu Ala Ile Gly
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Lys Met Arg Trp Val Tyr Lys Gly Thr Pro Gly Leu Arg Arg Leu
1220 1225 1230

Leu Asn Lys Ile Cys Leu Gly Ser Leu Gly Ile Ser Tyr Lys Cys
1235 1240 1245

Val Lys Pro Leu Leu Pro Arg Phe Met Ser Val Asn Phe Leu His
1250 1255 1260

Arg Leu Ser Val Ser Ser Arg Pro Met Glu Phe Pro Ala Ser Val
1265 1270 1275

Pro Ala Tyr Arg Thr Thr Asn Tyr His Phe Asp Thr Ser Pro Ile
1280 1285 1290

Asn Gln Ala Leu Ser Glu Arg Phe Gly Asn Glu Asp Ile Asn Leu
1295 1300 1305

Val Phe Gln Asn Ala Ile Ser Cys Gly Ile Ser Ile Met Ser Val
1310 1315 1320

Val Glu Gln Leu Thr Gly Arg Ser Pro Lys Gln Leu Val Leu Ile
1325 1330 1335

Pro Gln Leu Glu Glu Ile Asp Ile Met Pro Pro Pro Val Phe Gln
1340 1345 1350

Gly Lys Phe Asn Tyr Lys Leu Val Asp Lys Ile Thr Ser Asp Gln
1355 1360 1365

His Ile Phe Ser Pro Asp Lys Ile Asp Met Leu Thr Leu Gly Lys
1370 1375 1380

Met Leu Met Pro Thr Ile Lys Gly Gln Lys Thr Asp Gln Phe Leu
1385 1390 1395

Asn Lys Arg Glu Asn Tyr Phe His Gly Asn Asn Leu Ile Glu Ser
1400 1405 1410

Leu Ser Ala Ala Leu Ala Cys His Trp Cys Gly Ile Leu Thr Glu
1415 1420 1425

Gln Cys Ile Glu Asn Asn Ile Phe Lys Lys Asp Trp Gly Asp Gly
1430 1435 1440

Phe Ile Ser Asp His Ala Phe Met Asp Phe Lys Ile Phe Leu Cys
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Val Phe Lys Thr Lys Leu Leu Cys Ser Trp Gly Ser Gln Gly Lys
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Asn Ile Lys Asp Glu Asp Ile Val Asp Glu Ser Ile Asp Lys Leu
1475 1480 1485

Leu Arg Ile Asp Asn Thr Phe Trp Arg Met Phe Ser Lys Val Met
1490 1495 1500

Phe Glu Pro Lys Val Lys Lys Arg Ile Met Leu Tyr Asp Val Lys
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Phe Leu Ser Leu Val Gly Tyr Ile Gly Phe Lys Asn Trp Phe Ile
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Glu Gln Leu Arg Ser Ala Glu Leu His Glu Ile Pro Trp Ile Val
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Asn Ala Glu Gly Asp Leu Val Glu Ile Lys Ser Ile Lys Ile Tyr
1550 1555 1560

Leu Gln Leu Ile Glu Gln Ser Leu Phe Leu Arg Ile Thr Val Leu
1565 1570 1575

Asn Tyr Thr Asp Met Ala His Ala Leu Thr Arg Leu Ile Arg Lys
1580 1585 1590

Lys Leu Met Cys Asp Asn Ala Leu Leu Thr Pro Ile Ser Ser Pro
1595 1600 1605

Met Val Asn Leu Thr Gln Val Ile Asp Pro Thr Thr Gln Leu Asp
1610 1615 1620

Tyr Phe Pro Lys-Ile Thr Phe Glu Arg Leu Lys Asn Tyr Asp Thr
1625 1630 1635

Ser Ser Asn Tyr Ala Lys Gly Lys Leu Thr Arg Asn Tyr Met Ile
1640 1645 1650

Leu Leu Pro Trp Gln His Val Asn Arg Tyr Asn Phe Val Phe Ser
1655 1660 1665

Ser Thr Gly Cys Lys Val Ser Leu Lys Thr Cys Ile Gly Lys Leu
1670 1675 1680

Met Lys Asp Leu Asn Pro Lys Val Leu Tyr Phe Ile Gly Glu Gly
1685 1690 1695

Ala Gly Asn Trp Met Ala Arg Thr Ala Cys Glu Tyr Pro Asp Ile
1700 1705 1710

Lys Phe Val Tyr Arg Ser Leu Lys Asp Asp Leu Asp His His Tyr
1715 1720 1725

Pro Leu Glu Tyr Gln Arg Val Ile Gly Glu Leu Ser Arg Ile Ile
1730 1735 1740

Asp Ser Gly Glu Gly Leu Ser Met Glu Thr Thr Asp Ala Thr Gln
1745 1750 1755

Lys Thr His Trp Asp Leu Ile His Arg Val Ser Lys Asp Ala Leu
1760 1765 1770

Leu Ile Thr Leu Cys Asp Ala Glu Phe Lys Asp Arg Asp Asp Phe
1775 1780 1785

Phe Lys Met Val Ile Leu Trp Arg Lys His Val Leu Ser Cys Arg
1790 1795 1800

Ile Cys Thr Thr Tyr Gly Thr Asp Leu Tyr Leu Phe Ala Lys Tyr
1805 1810 1815

His Ala Lys Asp Cys Asn Val Lys Leu Pro Phe Phe Val Arg Ser
1820 1825 1830

Val Ala Thr Phe Ile Met Gln Gly Ser Lys Leu Ser Gly Ser Glu
1835 1840 1845

Cys Tyr Ile Leu Leu Thr Leu Gly His His Asn Ser Leu Pro Cys
1850 1855 1860

His Gly Glu Ile Gln Asn Ser Lys Met Lys Ile Ala Val Cys Asn
1865 1870 1875

Asp Phe Tyr Ala Ala Lys Lys Leu Asp Asn Lys Ser Ile Glu Ala
1880 1885 1890

Asn Cys Lys Ser Leu Leu Ser Gly Leu Arg Ile Pro Ile Asn Lys
1895 1900 1905

Lys Glu Leu Asp Arg Gln Arg Arg Leu Leu Thr Leu Gln Ser Asn
1910 1915 1920

His Ser Ser Val Ala Thr Val Gly Gly Ser Lys Ile Ile Glu Ser
1925 1930 1935

Lys Trp Leu Thr Asn Lys Ala Ser Thr Ile Ile Asp Trp Leu Glu
1940 1945 1950

His Ile Leu Asn Ser Pro Lys Gly Glu Leu Asn Tyr Asp Phe Phe
1955 1960 1965

Glu Ala Leu Glu Asn Thr Tyr Pro Asn Met Ile Lys Leu Ile Asp
1970 1975 1980

Asn Leu Gly Asn Ala Glu Ile Lys Lys Leu Ile Lys Val Thr Gly
1985 1990 1995

Tyr Met Leu Val Ser Lys Lys
2000 2005

<210> 8

<211> 177

<212> PRT

<213> human metapneumovirus

<400> 8

Met Lys Thr Leu Asp Val Ile Lys Ser Asp Gly Ser Ser Glu Thr Cys
1 5 10 15

Asn Gln Leu Lys Lys Ile Ile Lys Lys His Ser Gly Lys Leu Leu Ile
20 25 30

Ala Ser Lys Pro Thr Leu Ala Leu Leu Thr Ser Phe Thr Val Thr Ile
35 40 45

Thr Val Asn Tyr Thr Lys Val Glu Asn Asn Leu Gln Ala Cys Gln Leu
50 55 60

Lys Asn Glu Ser Asp Lys Lys Asp Thr Lys Leu Asn Thr Thr Ser Thr
65 70 75 80

Thr Ile Arg Pro Ile Pro Asp Leu Asn Ala Val Gln Tyr Leu Lys Arg
85 90 95

Leu Ile Gln Lys His Thr Asn Ser Val Thr Lys Asp Arg Asp Thr Cys
100 105 110

Trp Arg Ile His Thr Asn Gln Cys Thr Asn Ile Lys Ile Tyr Lys Phe
115 120 125

Leu Cys Phe Gly Ser Met Asn Ser Thr Asn Thr Asp Cys Glu Glu Pro
130 135 140

Thr Val Leu Cys Asp Lys Lys Ser Lys Thr Met Thr Glu Lys His Arg
145 150 155 160

Lys Ala Glu Cys His Arg Pro His Thr Thr Glu Trp Trp Cys His Tyr
165 170 175

Leu

<210> 9
<211> 236

<212> PRT

<213> human metapneumovirus

<400> 9

Met Glu Ala Arg Val Glu Asn Ile Arg Ala Ile Asp Met Phe Lys Ala
1 5 10 15

Lys Met Lys Asn Arg Ile Arg Ser Ser Lys Cys His Arg Asn Ala Thr
20 25 30

Leu Ile Leu Ile Gly Ser Thr Ala Pro Ser Met Ala Leu Asn Thr Leu
35 40 45

Leu Ile Ile Asp His Ala Thr Ser Lys Asn Met Thr Lys Val Glu His
50 55 60

Cys Val Asn Met Pro Pro Val Glu Pro Ser Lys Lys Thr Pro Met Thr
65 70 75 80

Ser Ala Ala Asp Pro Asn Thr Lys Pro Asn Pro Gln Gln Ala Thr Gln
85 90 95

Leu Thr Thr Glu Asp Ser Thr Ser Leu Ala Ala Thr Leu Glu Asp His
100 105 110

Leu His Thr Gly Thr Thr Pro Thr Pro Asp Ala Thr Val Ser Gln Gln
115 120 125

Thr Thr Asp Glu His Thr Thr Leu Leu Arg Ser Thr Asn Arg Gln Thr
130 135 140

Thr Gln Thr Thr Ala Glu Lys Lys Pro Thr Arg Ala Thr Thr Lys Lys
145 150 155 160

Glu Thr Thr Arg Thr Thr Ser Thr Ala Ala Thr Gln Thr Leu Asn
165 170 175

Thr Thr Asn Gln Thr Ser Asn Gly Arg Glu Ala Thr Thr Ser Ala
180 185 190

Arg Ser Arg Asn Asn Ala Thr Thr Gln Ser Ser Asp Gln Thr Thr Gln

195

200

205

Ala Ala Asp Pro Ser Ser Gln Ser Gln His Thr Gln Lys Ser Thr Thr
 210 215 220

Thr Thr His Asn Thr Asp Thr Ser Ser Pro Ser Ser
 225 230 235

<210> 10
 <211> 183
 <212> PRT
 <213> human metapneumovirus

<400> 10

Met Ile Thr Leu Asp Val Ile Lys Ser Asp Gly Ser Ser Lys Thr Cys
 1 5 10 15

Thr His Leu Lys Lys Ile Ile Lys Asp His Ser Gly Lys Val Leu Ile
 20 25 30

Val Leu Lys Leu Ile Leu Ala Leu Leu Thr Phe Leu Thr Val Thr Ile
 35 40 45

Thr Ile Asn Tyr Ile Lys Val Glu Asn Asn Leu Gln Ile Cys Gln Ser
 50 55 60

Lys Thr Glu Ser Asp Lys Lys Asp Ser Ser Ser Asn Thr Thr Ser Val
 65 70 75 80

Thr Thr Lys Thr Thr Leu Asn His Asp Ile Thr Gln Tyr Phe Lys Ser
 85 90 95

Leu Ile Gln Arg Tyr Thr Asn Ser Ala Ile Asn Ser Asp Thr Cys Trp
 100 105 110

Lys Ile Asn Arg Asn Gln Cys Thr Asn Ile Thr Thr Tyr Lys Phe Leu
 115 120 125

Cys Phe Lys Ser Glu Asp Thr Lys Thr Asn Asn Cys Asp Lys Leu Thr
 130 135 140

Asp Leu Cys Arg Asn Lys Pro Lys Pro Ala Val Gly Val Tyr His Ile
 145 150 155 160

Val Glu Cys His Cys Ile Tyr Thr Val Lys Trp Lys Cys Tyr His Tyr
 165 170 175

Pro Thr Asp Glu Thr Gln Ser
180

<210> 11
<211> 236
<212> PRT
<213> human metapneumovirus

<400> 11

Met Glu Val Lys Val Glu Asn Ile Arg Thr Ile Asp Met Leu Lys Ala
1 5 10 15

Arg Val Lys Asn Arg Val Ala Arg Ser Lys Cys Phe Lys Asn Ala Ser
20 25 30

Leu Val Leu Ile Gly Ile Thr Thr Leu Ser Ile Ala Leu Asn Ile Tyr
35 40 45

Leu Ile Ile Asn Tyr Lys Met Gln Lys Asn Thr Ser Glu Ser Glu His
50 55 60

His Thr Ser Ser Ser Pro Met Glu Ser Ser Arg Glu Thr Pro Thr Val
65 70 75 80

Pro Thr Asp Asn Ser Asp Thr Asn Ser Ser Pro Gln His Pro Thr Gln
85 90 95

Gln Ser Thr Glu Gly Ser Thr Leu Tyr Phe Ala Ala Ser Ala Ser Ser
100 105 110

Pro Glu Thr Glu Pro Thr Ser Thr Pro Asp Thr Thr Asn Arg Pro Pro
115 120 125

Phe Val Asp Thr His Thr Thr Pro Pro Ser Ala Ser Arg Thr Lys Thr
130 135 140

Ser Pro Ala Val His Thr Lys Asn Asn Pro Arg Thr Ser Ser Arg Thr
145 150 155 160

His Ser Pro Pro Arg Ala Thr Thr Arg Thr Ala Arg Arg Thr Thr Thr
165 170 175

Leu Arg Thr Ser Ser Thr Arg Lys Arg Pro Ser Thr Ala Ser Val Gln
180 185 190

Pro Asp Ile Ser Ala Thr Thr His Lys Asn Glu Glu Ala Ser Pro Ala
195 200 205

Ser Pro Gln Thr Ser Ala Ser Thr Thr Arg Ile Gln Arg Lys Ser Val
210 215 220

Glu Ala Asn Thr Ser Thr Thr Tyr Asn Gln Thr Ser
225 230 235

<210> 12

<211> 2005

<212> PRT

<213> human metapneumovirus

<400> 12

Met Asp Pro Leu Asn Glu Ser Thr Val Asn Val Tyr Leu Pro Asp Ser
1 5 10 15

Tyr Leu Lys Gly Val Ile Ser Phe Ser Glu Thr Asn Ala Ile Gly Ser
20 25 30

Cys Leu Leu Lys Arg Pro Tyr Leu Lys Asn Asp Asn Thr Ala Lys Val
35 40 45

Ala Ile Glu Asn Pro Val Ile Glu His Val Arg Leu Lys Asn Ala Val
50 55 60

Asn Ser Lys Met Lys Ile Ser Asp Tyr Lys Ile Val Glu Pro Val Asn
65 70 75 80

Met Gln His Glu Ile Met Lys Asn Val His Ser Cys Glu Leu Thr Leu
85 90 95

Leu Lys Gln Phe Leu Thr Arg Ser Lys Asn Ile Ser Thr Leu Lys Leu
100 105 110

Asn Met Ile Cys Asp Trp Leu Gln Leu Lys Ser Thr Ser Asp Asp Thr
115 120 125

Ser Ile Leu Ser Phe Ile Asp Val Glu Phe Ile Pro Ser Trp Val Ser
130 135 140

Asn Trp Phe Ser Asn Trp Tyr Asn Leu Asn Lys Leu Ile Leu Glu Phe
145 150 155 160

Arg Lys Glu Glu Val Ile Arg Thr Gly Ser Ile Leu Cys Arg Ser Leu
165 170 175

Gly Lys Leu Val Phe Val Val Ser Ser Tyr Gly Cys Ile Val Lys Ser
180 185 190

Asn Lys Ser Lys Arg Val Ser Phe Phe Thr Tyr Asn Gln Leu Leu Thr
195 200 205

Trp Lys Asp Val Met Leu Ser Arg Phe Asn Ala Asn Phe Cys Ile Trp
210 215 220

Val Ser Asn Ser Leu Asn Glu Asn Gln Glu Gly Leu Gly Leu Arg Ser
225 230 235 240

Asn Leu Gln Gly Ile Leu Thr Asn Lys Leu Tyr Glu Thr Val Asp Tyr
245 250 255

Met Leu Ser Leu Cys Cys Asn Glu Gly Phe Ser Leu Val Lys Glu Phe
260 265 270

Glu Gly Phe Ile Met Ser Glu Ile Leu Arg Ile Thr Glu His Ala Gln
275 280 285

Phe Ser Thr Arg Phe Arg Asn Thr Leu Leu Asn Gly Leu Thr Asp Gln
290 295 300

Leu Thr Lys Leu Lys Asn Lys Asn Arg Leu Arg Val His Gly Thr Val
305 310 315 320

Leu Glu Asn Asn Asp Tyr Pro Met Tyr Glu Val Val Leu Lys Leu Leu
325 330 335

Gly Asp Thr Leu Arg Cys Ile Lys Leu Leu Ile Asn Lys Asn Leu Glu
340 345 350

Asn Ala Ala Glu Leu Tyr Tyr Ile Phe Arg Ile Phe Gly His Pro Met
355 360 365

Val Asp Glu Arg Asp Ala Met Asp Ala Val Lys Leu Asn Asn Glu Ile
370 375 380

Thr Lys Ile Leu Arg Trp Glu Ser Leu Thr Glu Leu Arg Gly Ala Phe
385 390 395 400

Ile Leu Arg Ile Ile Lys Gly Phe Val Asp Asn Asn Lys Arg Trp Pro
405 410 415

Lys Ile Lys Asn Leu Lys Val Leu Ser Lys Arg Trp Thr Met Tyr Phe
420 425 430

Lys Ala Lys Ser Tyr Pro Ser Gln Leu Glu Leu Ser Glu Gln Asp Phe
435 440 445

Leu Glu Leu Ala Ala Ile Gln Phe Glu Gln Glu Phe Ser Val Pro Glu
450 455 460

Lys Thr Asn Leu Glu Met Val Leu Asn Asp Lys Ala Ile Ser Pro Pro
465 470 475 480

Lys Arg Leu Ile Trp Ser Val Tyr Pro Lys Asn Tyr Leu Pro Glu Lys
485 490 495

Ile Lys Asn Arg Tyr Leu Glu Glu Thr Phe Asn Ala Ser Asp Ser Leu
500 505 510

Lys Thr Arg Arg Val Leu Glu Tyr Tyr Leu Lys Asp Asn Lys Phe Asp
515 520 525

Gln Lys Glu Leu Lys Ser Tyr Val Val Lys Gln Glu Tyr Leu Asn Asp
530 535 540

Lys Asp His Ile Val Ser Leu Thr Gly Lys Glu Arg Glu Leu Ser Val
545 550 555 560

Gly Arg Met Phe Ala Met Gln Pro Gly Lys Gln Arg Gln Ile Gln Ile
565 570 575

Leu Ala Glu Lys Leu Leu Ala Asp Asn Ile Val Pro Phe Phe Pro Glu
580 585 590 595

Thr Leu Thr Lys Tyr Gly Asp Leu Asp Leu Gln Arg Ile Met Glu Ile
595 600 605

Lys Ser Glu Leu Ser Ser Ile Lys Thr Arg Arg Asn Asp Ser Tyr Asn
610 615 620

Asn Tyr Ile Ala Arg Ala Ser Ile Val Thr Asp Leu Ser Lys Phe Asn
625 630 635 640

Gln Ala Phe Arg Tyr Glu Thr Thr Ala Ile Cys Ala Asp Val Ala Asp
645 650 655

Glu Leu His Gly Thr Gln Ser Leu Phe Cys Trp Leu His Leu Ile Val
660 665 670

Pro Met Thr Thr Met Ile Cys Ala Tyr Arg His Ala Pro Pro Glu Thr
675 680 685

Lys Gly Glu Tyr Asp Ile Asp Lys Ile Glu Glu Gln Ser Gly Leu Tyr
690 695 700

Arg Tyr His Met Gly Gly Ile Glu Gly Trp Cys Gln Lys Leu Trp Thr
705 710 715 720

Met Glu Ala Ile Ser Leu Leu Asp Val Val Ser Val Lys Thr Arg Cys
725 730 735

Gln Met Thr Ser Leu Leu Asn Gly Asp Asn Gln Ser Ile Asp Val Ser
740 745 750

Lys Pro Val Lys Leu Ser Glu Gly Leu Asp Glu Val Lys Ala Asp Tyr
755 760 765

Ser Leu Ala Val Lys Met Leu Lys Glu Ile Arg Asp Ala Tyr Arg Asn
770 775 780

Ile Gly His Lys Leu Lys Glu Gly Glu Thr Tyr Ile Ser Arg Asp Leu
785 790 795 800

Gln Phe Ile Ser Lys Val Ile Gln Ser Glu Gly Val Met His Pro Thr
805 810 815

Pro Ile Lys Lys Ile Leu Arg Val Gly Pro Trp Ile Asn Thr Ile Leu
820 825 830

Asp Asp Ile Lys Thr Ser Ala Glu Ser Ile Gly Ser Leu Cys Gln Glu
835 840 845

Leu Glu Phe Arg Gly Glu Ser Ile Ile Val Ser Leu Ile Leu Arg Asn
850 855 860

Phe Trp Leu Tyr Asn Leu Tyr Met His Glu Ser Lys Gln His Pro Leu
865 870 875 880

Ala Gly Lys Gln Leu Phe Lys Gln Leu Asn Lys Thr Leu Thr Ser Val
885 890 895

Gln Arg Phe Phe Glu Ile Lys Lys Glu Asn Glu Val Val Asp Leu Trp
900 905 910

Met Asn Ile Pro Met Gln Phe Gly Gly Gly Asp Pro Val Val Phe Tyr
915 920 925

Arg Ser Phe Tyr Arg Arg Thr Pro Asp Phe Leu Thr Glu Ala Ile Ser
930 935 940

His Val Asp Ile Leu Leu Arg Ile Ser Ala Asn Ile Arg Asn Glu Ala
945 950 955 960

Lys Ile Ser Phe Phe Lys Ala Leu Leu Ser Ile Glu Lys Asn Glu Arg
965 970 975

Ala Thr Leu Thr Thr Leu Met Arg Asp Pro Gln Ala Val Gly Ser Glu
980 985 990

Arg Gln Ala Lys Val Thr Ser Asp Ile Asn Arg Thr Ala Val Thr Ser
995 1000 1005

Ile Leu Ser Leu Ser Pro Asn Gln Leu Phe Ser Asp Ser Ala Ile
1010 1015 1020

His Tyr Ser Arg Asn Glu Glu Glu Val Gly Ile Ile Ala Asp Asn
1025 1030 1035

Ile Thr Pro Val Tyr Pro His Gly Leu Arg Val Leu Tyr Glu Ser
1040 1045 1050

Leu Pro Phe His Lys Ala Glu Lys Val Val Asn Met Ile Ser Gly
1055 1060 1065

Thr Lys Ser Ile Thr Asn Leu Leu Gln Arg Thr Ser Ala Ile Asn
1070 1075 1080

Gly Glu Asp Ile Asp Arg Ala Val Ser Met Met Leu Glu Asn Leu
1085 1090 1095

Gly Leu Leu Ser Arg Ile Leu Ser Val Val Val Asp Ser Ile Glu
1100 1105 1110

Ile Pro Thr Lys Ser Asn Gly Arg Leu Ile Cys Cys Gln Ile Ser
1115 1120 1125

Arg Thr Leu Arg Glu Thr Ser Trp Asn Asn Met Glu Ile Val Gly
1130 1135 1140

Val Thr Ser Pro Ser Ile Thr Thr Cys Met Asp Val Ile Tyr Ala
1145 1150 1155

Thr Ser Ser His Leu Lys Gly Ile Ile Ile Glu Lys Phe Ser Thr
1160 1165 1170

Asp Arg Thr Thr Arg Gly Gln Arg Gly Pro Lys Ser Pro Trp Val
1175 1180 1185

Gly Ser Ser Thr Gln Glu Lys Lys Leu Val Pro Val Tyr Asn Arg
1190 1195 1200

Gln Ile Leu Ser Lys Gln Gln Arg Glu Gln Leu Glu Ala Ile Gly
1205 1210 1215

Lys Met Arg Trp Val Tyr Lys Gly Thr Pro Gly Leu Arg Arg Leu
1220 1225 1230

Leu Asn Lys Ile Cys Leu Gly Ser Leu Gly Ile Ser Tyr Lys Cys
1235 1240 1245

Val Lys Pro Leu Leu Pro Arg Phe Met Ser Val Asn Phe Leu His
1250 1255 1260

Arg Leu Ser Val Ser Ser Arg Pro Met Glu Phe Pro Ala Ser Val
1265 1270 1275

Pro Ala Tyr Arg Thr Thr Asn Tyr His Phe Asp Thr Ser Pro Ile
1280 1285 1290

Asn Gln Ala Leu Ser Glu Arg Phe Gly Asn Glu Asp Ile Asn Leu
1295 1300 1305

Val Phe Gln Asn Ala Ile Ser Cys Gly Ile Ser Ile Met Ser Val
1310 1315 1320

Val Glu Gln Leu Thr Gly Arg Ser Pro Lys Gln Leu Val Leu Ile
1325 1330 1335

Pro Gln Leu Glu Glu Ile Asp Ile Met Pro Pro Pro Val Phe Gln
1340 1345 1350

Gly Lys Phe Asn Tyr Lys Leu Val Asp Lys Ile Thr Ser Asp Gln
1355 1360 1365

His Ile Phe Ser Pro Asp Lys Ile Asp Met Leu Thr Leu Gly Lys
1370 1375 1380

Met Leu Met Pro Thr Ile Lys Gly Gln Lys Thr Asp Gln Phe Leu
1385 1390 1395

Asn Lys Arg Glu Asn Tyr Phe His Gly Asn Asn Leu Ile Glu Ser
1400 1405 1410

Leu Ser Ala Ala Leu Ala Cys His Trp Cys Gly Ile Leu Thr Glu
1415 1420 1425

Gln Cys Ile Glu Asn Asn Ile Phe Lys Lys Asp Trp Gly Asp Gly
1430 1435 1440

Phe Ile Ser Asp His Ala Phe Met Asp Phe Lys Ile Phe Leu Cys
1445 1450 1455

Val Phe Lys Thr Lys Leu Leu Cys Ser Trp Gly Ser Gln Gly Lys
1460 1465 1470

Asn Ile Lys Asp Glu Asp Ile Val Asp Glu Ser Ile Asp Lys Leu
1475 1480 1485

Leu Arg Ile Asp Asn Thr Phe Trp Arg Met Phe Ser Lys Val Met
1490 1495 1500

Phe Glu Ser Lys Val Lys Lys Arg Ile Met Leu Tyr Asp Val Lys
1505 1510 1515

Phe Leu Ser Leu Val Gly Tyr Ile Gly Phe Lys Asn Trp Phe Ile
1520 1525 1530

Glu Gln Leu Arg Ser Ala Glu Leu His Glu Val Pro Trp Ile Val
1535 1540 1545

Asn Ala Glu Gly Asp Leu Val Glu Ile Lys Ser Ile Lys Ile Tyr
1550 1555 1560

Leu Gln Leu Ile Glu Gln Ser Leu Phe Leu Arg Ile Thr Val Leu
1565 1570 1575

Asn Tyr Thr Asp Met Ala His Ala Leu Thr Arg Leu Ile Arg Lys
1580 1585 1590

Lys Leu Met Cys Asp Asn Ala Leu Leu Thr Pro Ile Pro Ser Pro
1595 1600 1605

Met Val Asn Leu Thr Gln Val Ile Asp Pro Thr Glu Gln Leu Ala
1610 1615 1620

Tyr Phe Pro Lys Ile Thr Phe Glu Arg Leu Lys Asn Tyr Asp Thr
1625 1630 1635

Ser Ser Asn Tyr Ala Lys Gly Lys Leu Thr Arg Asn Tyr Met Ile
1640 1645 1650

Leu Leu Pro Trp Gln His Val Asn Arg Tyr Asn Phe Val Phe Ser
1655 1660 1665

Ser Thr Gly Cys Lys Val Ser Leu Lys Thr Cys Ile Gly Lys Leu
1670 1675 1680

Met Lys Asp Leu Asn Pro Lys Val Leu Tyr Phe Ile Gly Glu Gly
1685 1690 1695

Ala Gly Asn Trp Met Ala Arg Thr Ala Cys Glu Tyr Pro Asp Ile
1700 1705 1710

Lys Phe Val Tyr Arg Ser Leu Lys Asp Asp Leu Asp His His Tyr
1715 1720 1725

Pro Leu Glu Tyr Gln Arg Val Ile Gly Glu Leu Ser Arg Ile Ile
1730 1735 1740

Asp Ser Gly Glu Gly Leu Ser Met Glu Thr Thr Asp Ala Thr Gln
1745 1750 1755

Lys Thr His Trp Asp Leu Ile His Arg Val Ser Lys Asp Ala Leu
1760 1765 1770

Leu Ile Thr Leu Cys Asp Ala Glu Phe Lys Asp Arg Asp Asp Phe
1775 1780 1785

Phe Lys Met Val Ile Leu Trp Arg Lys His Val Leu Ser Cys Arg
1790 1795 1800

Ile Cys Thr Thr Tyr Gly Thr Asp Leu Tyr Leu Phe Ala Lys Tyr
1805 1810 1815

His Ala Lys Asp Cys Asn Val Lys Leu Pro Phe Phe Val Arg Ser
1820 1825 1830

Val Ala Thr Phe Ile Met Gln Gly Ser Lys Leu Ser Gly Ser Glu
1835 1840 1845

Cys Tyr Ile Leu Leu Thr Leu Gly His His Asn Asn Leu Pro Cys
1850 1855 1860

His Gly Glu Ile Gln Asn Ser Lys Met Lys Ile Ala Val Cys Asn
1865 1870 1875

Asp Phe Tyr Ala Ala Lys Lys Leu Asp Asn Lys Ser Ile Glu Ala
1880 1885 1890

Asn Cys Lys Ser Leu Leu Ser Gly Leu Arg Ile Pro Ile Asn Lys
1895 1900 1905

Lys Glu Leu Asn Arg Gln Arg Arg Leu Leu Thr Leu Gln Ser Asn
1910 1915 1920

His Ser Ser Val Ala Thr Val Gly Gly Ser Lys Val Ile Glu Ser
1925 1930 1935

Lys Trp Leu Thr Asn Lys Ala Asn Thr Ile Ile Asp Trp Leu Glu
1940 1945 1950

His Ile Leu Asn Ser Pro Lys Gly Glu Leu Asn Tyr Asp Phe Phe
1955 1960 1965

Glu Ala Leu Glu Asn Thr Tyr Pro Asn Met Ile Lys Leu Ile Asp
1970 1975 1980

Asn Leu Gly Asn Ala Glu Ile Lys Lys Leu Ile Lys Val Thr Gly
1985 1990 1995

Tyr Met Leu Val Ser Lys Lys
2000 2005

<210> 13
<211> 2165
<212> PRT
<213> human respiratory syncytial virus strain A2

<400> 13

Met Asp Pro Ile Ile Asn Gly Asn Ser Ala Asn Val Tyr Leu Thr Asp
1 5 10 15

Ser Tyr Leu Lys Gly Val Ile Ser Phe Ser Glu Cys Asn Ala Leu Gly
20 25 30

Ser Tyr Ile Phe Asn Gly Pro Tyr Leu Lys Asn Asp Tyr Thr Asn Leu
35 40 45

Ile Ser Arg Gln Asn Pro Leu Ile Glu His Met Asn Leu Lys Lys Leu
50 55 60

Asn Ile Thr Gln Ser Leu Ile Ser Lys Tyr His Lys Gly Glu Ile Lys
65 70 75 80

Leu Glu Glu Pro Thr Tyr Phe Gln Ser Leu Leu Met Thr Tyr Lys Ser
85 90 95

Met Thr Ser Ser Glu Gln Ile Ala Thr Thr Asn Leu Leu Lys Lys Ile
100 105 110

Ile Arg Arg Ala Ile Glu Ile Ser Asp Val Lys Val Tyr Ala Ile Leu
115 120 125

Asn Lys Leu Gly Leu Lys Glu Lys Asp Lys Ile Lys Ser Asn Asn Gly
130 135 140

Gln Asp Glu Asp Asn Ser Val Ile Thr Thr Ile Ile Lys Asp Asp Ile
145 150 155 160

Leu Ser Ala Val Lys Asp Asn Gln Ser His Leu Lys Ala Asp Lys Asn
165 170 175

His Ser Thr Lys Gln Lys Asp Thr Ile Lys Thr Thr Leu Leu Lys Lys
180 185 190

Leu Met Cys Ser Met Gln His Pro Pro Ser Trp Leu Ile His Trp Phe
195 200 205

Asn Leu Tyr Thr Lys Leu Asn Asn Ile Leu Thr Gln Tyr Arg Ser Asn

210

215

220

Glu Val Lys Asn His Gly Phe Thr Leu Ile Asp Asn Gln Thr Leu Ser
225 230 235 240

Gly Phe Gln Phe Ile Leu Asn Gln Tyr Gly Cys Ile Val Tyr His Lys
245 250 255

Glu Leu Lys Arg Ile Thr Val Thr Tyr Asn Gln Phe Leu Thr Trp
260 265 270

Lys Asp Ile Ser Leu Ser Arg Leu Asn Val Cys Leu Ile Thr Trp Ile
275 280 285

Ser Asn Cys Leu Asn Thr Leu Asn Lys Ser Leu Gly Leu Arg Cys Gly
290 295 300

Phe Asn Asn Val Ile Leu Thr Gln Leu Phe Leu Tyr Gly Asp Cys Ile
305 310 315 320

Leu Lys Leu Phe His Asn Glu Gly Phe Tyr Ile Ile Lys Glu Val Glu
325 330 335

Gly Phe Ile Met Ser Leu Ile Leu Asn Ile Thr Glu Glu Asp Gln Phe
340 345 350

Arg Lys Arg Phe Tyr Asn Ser Met Leu Asn Asn Ile Thr Asp Ala Ala
355 360 365

Asn Lys Ala Gln Lys Asn Leu Leu Ser Arg Val Cys His Thr Leu Leu
370 375 380

Asp Lys Thr Val Ser Asp Asn Ile Ile Asn Gly Arg Trp Ile Ile Leu
385 390 395 400

Leu Ser Lys Phe Leu Lys Leu Ile Lys Leu Ala Gly Asp Asn Asn Leu
405 410 415

Asn Asn Leu Ser Glu Leu Tyr Phe Leu Phe Arg Ile Phe Gly His Pro
420 425 430

Met Val Asp Glu Arg Gln Ala Met Asp Ala Val Lys Ile Asn Cys Asn
435 440 445

Glu Thr Lys Phe Tyr Leu Leu Ser Ser Leu Ser Met Leu Arg Gly Ala

450

455

460

Phe Ile Tyr Arg Ile Ile Lys Gly Phe Val Asn Asn Tyr Asn Arg Trp
465 470 475 480

Pro Thr Leu Arg Asn Ala Ile Val Leu Pro Leu Arg Trp Leu Thr Tyr
485 490 495

Tyr Lys Leu Asn Thr Tyr Pro Ser Leu Leu Glu Leu Thr Glu Arg Asp
500 505 510

Leu Ile Val Leu Ser Gly Leu Arg Phe Tyr Arg Glu Phe Arg Leu Pro
515 520 525

Lys Lys Val Asp Leu Glu Met Ile Ile Asn Asp Lys Ala Ile Ser Pro
530 535 540

Pro Lys Asn Leu Ile Trp Thr Ser Phe Pro Arg Asn Tyr Met Pro Ser
545 550 555 560

His Ile Gln Asn Tyr Ile Glu His Glu Lys Leu Lys Phe Ser Glu Ser
565 570 575

Asp Lys Ser Arg Arg Val Leu Glu Tyr Tyr Leu Arg Asp Asn Lys Phe
580 585 590

Asn Glu Cys Asp Leu Tyr Asn Cys Val Val Asn Gln Ser Tyr Leu Asn
595 600 605

Asn Pro Asn His Val Val Ser Leu Thr Gly Lys Glu Arg Glu Leu Ser
610 615 620

Val Gly Arg Met Phe Ala Met Gln Pro Gly Met Phe Arg Gln Val Gln
625 630 635 640

Ile Leu Ala Glu Lys Met Ile Ala Glu Asn Ile Leu Gln Phe Phe Pro
645 650 655

Glu Ser Leu Thr Arg Tyr Gly Asp Leu Glu Leu Gln Lys Ile Leu Glu
660 665 670

Leu Lys Ala Gly Ile Ser Asn Lys Ser Asn Arg Tyr Asn Asp Asn Tyr
675 680 685

Asn Asn Tyr Ile Ser Lys Cys Ser Ile Ile Thr Asp Leu Ser Lys Phe

690

695

700

Asn Gln Ala Phe Arg Tyr Glu Thr Ser Cys Ile Cys Ser Asp Val Leu
 705 710 715 720

Asp Glu Leu His Gly Val Gln Ser Leu Phe Ser Trp Leu His Leu Thr
 725 730 735

Ile Pro His Val Thr Ile Ile Cys Thr Tyr Arg His Ala Pro Pro Tyr
 740 745 750

Ile Gly Asp His Ile Val Asp Leu Asn Asn Val Asp Glu Gln Ser Gly
 755 760 765

Leu Tyr Arg Tyr His Met Gly Gly Ile Glu Gly Trp Cys Gln Lys Leu
 770 775 780

Trp Thr Ile Glu Ala Ile Ser Leu Leu Asp Leu Ile Ser Leu Lys Gly
 785 790 795 800

Lys Phe Ser Ile Thr Ala Leu Ile Asn Gly Asp Asn Gln Ser Ile Asp
 805 810 815

Ile Ser Lys Pro Ile Arg Leu Met Glu Gly Gln Thr His Ala Gln Ala
 820 825 830

Asp Tyr Leu Leu Ala Leu Asn Ser Leu Lys Leu Leu Tyr Lys Glu Tyr
 835 840 845

Ala Gly Ile Gly His Lys Leu Lys Gly Thr Glu Thr Tyr Ile Ser Arg
 850 855 860

Asp Met Gln Phe Met Ser Lys Thr Ile Gln His Asn Gly Val Tyr Tyr
 865 870 875 880

Pro Ala Ser Ile Lys Lys Val Leu Arg Val Gly Pro Trp Ile Asn Thr
 885 890 895

Ile Leu Asp Asp Phe Lys Val Ser Leu Glu Ser Ile Gly Ser Leu Thr
 900 905 910

Gln Glu Leu Glu Tyr Arg Gly Glu Ser Leu Leu Cys Ser Leu Ile Phe
 915 920 925

Arg Asn Val Trp Leu Tyr Asn Gln Ile Ala Leu Gln Leu Lys Asn His

930

935

940

Ala Leu Cys Asn Asn Lys Leu Tyr Leu Asp Ile Leu Lys Val Leu Lys
945 950 955 960

His Leu Lys Thr Phe Phe Asn Leu Asp Asn Ile Asp Thr Ala Leu Thr
965 970 975

Leu Tyr Met Asn Leu Pro Met Leu Phe Gly Gly Gly Asp Pro Asn Leu
980 985 990

Leu Tyr Arg Ser Phe Tyr Arg Arg Thr Pro Asp Phe Leu Thr Glu Ala
995 1000 1005

Ile Val His Ser Val Phe Ile Leu Ser Tyr Tyr Thr Asn His Asp
1010 1015 1020

Leu Lys Asp Lys Leu Gln Asp Leu Ser Asp Asp Arg Leu Asn Lys
1025 1030 1035

Phe Leu Thr Cys Ile Ile Thr Phe Asp Lys Asn Pro Asn Ala Glu
1040 1045 1050

Phe Val Thr Leu Met Arg Asp Pro Gln Ala Leu Gly Ser Glu Arg
1055 1060 1065

Gln Ala Lys Ile Thr Ser Glu Ile Asn Arg Leu Ala Val Thr Glu
1070 1075 1080

Val Leu Ser Thr Ala Pro Asn Lys Ile Phe Ser Lys Ser Ala Gln
1085 1090 1095

His Tyr Thr Thr Glu Ile Asp Leu Asn Asp Ile Met Gln Asn
1100 1105 1110

Ile Glu Pro Thr Tyr Pro His Gly Leu Arg Val Val Tyr Glu Ser
1115 1120 1125

Leu Pro Phe Tyr Lys Ala Glu Lys Ile Val Asn Leu Ile Ser Gly
1130 1135 1140

Thr Lys Ser Ile Thr Asn Ile Leu Glu Lys Thr Ser Ala Ile Asp
1145 1150 1155

Leu Thr Asp Ile Asp Arg Ala Thr Glu Met Met Arg Lys Asn Ile

1160

1165

1170

Thr Leu Leu Ile Arg Ile Leu Pro Leu Asp Cys Asn Arg Asp Lys
 1175 1180 1185

Arg Glu Ile Leu Ser Met Glu Asn Leu Ser Ile Thr Glu Leu Ser
 1190 1195 1200

Lys Tyr Val Arg Glu Arg Ser Trp Ser Leu Ser Asn Ile Val Gly
 1205 1210 1215

Val Thr Ser Pro Ser Ile Met Tyr Thr Met Asp Ile Lys Tyr Thr
 1220 1225 1230

Thr Ser Thr Ile Ser Ser Gly Ile Ile Ile Glu Lys Tyr Asn Val
 1235 1240 1245

Asn Ser Leu Thr Arg Gly Glu Arg Gly Pro Thr Lys Pro Trp Val
 1250 1255 1260

Gly Ser Ser Thr Gln Glu Lys Lys Thr Met Pro Val Tyr Asn Arg
 1265 1270 1275

Gln Val Leu Thr Lys Lys Gln Arg Asp Gln Ile Asp Leu Leu Ala
 1280 1285 1290

Lys Leu Asp Trp Val Tyr Ala Ser Ile Asp Asn Lys Asp Glu Phe
 1295 1300 1305

Met Glu Glu Leu Ser Ile Gly Thr Leu Gly Leu Thr Tyr Glu Lys
 1310 1315 1320

Ala Lys Lys Leu Phe Pro Gln Tyr Leu Ser Val Asn Tyr Leu His
 1325 1330 1335

Arg Leu Thr Val Ser Ser Arg Pro Cys Glu Phe Pro Ala Ser Ile
 1340 1345 1350

Pro Ala Tyr Arg Thr Thr Asn Tyr His Phe Asp Thr Ser Pro Ile
 1355 1360 1365

Asn Arg Ile Leu Thr Glu Lys Tyr Gly Asp Glu Asp Ile Asp Ile
 1370 1375 1380

Val Phe Gln Asn Cys Ile Ser Phe Gly Leu Ser Leu Met Ser Val

1385

1390

1395

Val Glu Gln Phe Thr Asn Val Cys Pro Asn Arg Ile Ile Leu Ile
 1400 1405 1410

Pro Lys Leu Asn Glu Ile His Leu Met Lys Pro Pro Ile Phe Thr
 1415 1420 1425

Gly Asp Val Asp Ile His Lys Leu Lys Gln Val Ile Gln Lys Gln
 1430 1435 1440

His Met Phe Leu Pro Asp Lys Ile Ser Leu Thr Gln Tyr Val Glu
 1445 1450 1455

Leu Phe Leu Ser Asn Lys Thr Leu Lys Ser Gly Ser His Val Asn
 1460 1465 1470

Ser Asn Leu Ile Leu Ala His Lys Ile Ser Asp Tyr Phe His Asn
 1475 1480 1485

Thr Tyr Ile Leu Ser Thr Asn Leu Ala Gly His Trp Ile Leu Ile
 1490 1495 1500

Ile Gln Leu Met Lys Asp Ser Lys Gly Ile Phe Glu Lys Asp Trp
 1505 1510 1515

Gly Glu Gly Tyr Ile Thr Asp His Met Phe Ile Asn Leu Lys Val
 1520 1525 1530

Phe Phe Asn Ala Tyr Lys Thr Tyr Leu Leu Cys Phe His Lys Gly
 1535 1540 1545

Tyr Gly Lys Ala Lys Leu Glu Cys Asp Met Asn Thr Ser Asp Leu
 1550 1555 1560

Leu Cys Val Leu Glu Leu Ile Asp Ser Ser Tyr Trp Lys Ser Met
 1565 1570 1575

Ser Lys Val Phe Leu Glu Gln Lys Val Ile Lys Tyr Ile Leu Ser
 1580 1585 1590

Gln Asp Ala Ser Leu His Arg Val Lys Gly Cys His Ser Phe Lys
 1595 1600 1605

Leu Trp Phe Leu Lys Arg Leu Asn Val Ala Glu Phe Thr Val Cys

1610

1615

1620

Pro Trp Val Val Asn Ile Asp Tyr His Pro Thr His Met Lys Ala
1625 1630 1635

Ile Leu Thr Tyr Ile Asp Leu Val Arg Met Gly Leu Ile Asn Ile
1640 1645 1650

Asp Arg Ile His Ile Lys Asn Lys His Lys Phe Asn Asp Glu Phe
1655 1660 1665

Tyr Thr Ser Asn Leu Phe Tyr Ile Asn Tyr Asn Phe Ser Asp Asn
1670 1675 1680

Thr His Leu Leu Thr Lys His Ile Arg Ile Ala Asn Ser Glu Leu
1685 1690 1695

Glu Asn Asn Tyr Asn Lys Leu Tyr His Pro Thr Pro Glu Thr Leu
1700 1705 1710

Glu Asn Ile Leu Ala Asn Pro Ile Lys Ser Asn Asp Lys Lys Thr
1715 1720 1725

Leu Asn Asp Tyr Cys Ile Gly Lys Asn Val Asp Ser Ile Met Leu
1730 1735 1740

Pro Leu Leu Ser Asn Lys Lys Leu Ile Lys Ser Ser Ala Met Ile
1745 1750 1755

Arg Thr Asn Tyr Ser Lys Gln Asp Leu Tyr Asn Leu Phe Pro Met
1760 1765 1770

Val Val Ile Asp Arg Ile Ile Asp His Ser Gly Asn Thr Ala Lys
1775 1780 1785

Ser Asn Gln Leu Tyr Thr Thr Ser His Gln Ile Ser Leu Val
1790 1795 1800

His Asn Ser Thr Ser Leu Tyr Cys Met Leu Pro Trp His His Ile
1805 1810 1815

Asn Arg Phe Asn Phe Val Phe Ser Ser Thr Gly Cys Lys Ile Ser
1820 1825 1830

Ile Glu Tyr Ile Leu Lys Asp Leu Lys Ile Lys Asp Pro Asn Cys

1835

1840

1845

Ile Ala Phe Ile Gly Glu Gly Ala Gly Asn Leu Leu Leu Arg Thr
1850 1855 1860

Val Val Glu Leu His Pro Asp Ile Arg Tyr Ile Tyr Arg Ser Leu
1865 1870 1875

Lys Asp Cys Asn Asp His Ser Leu Pro Ile Glu Phe Leu Arg Leu
1880 1885 1890

Tyr Asn Gly His Ile Asn Ile Asp Tyr Gly Glu Asn Leu Thr Ile
1895 1900 1905

Pro Ala Thr Asp Ala Thr Asn Asn Ile His Trp Ser Tyr Leu His
1910 1915 1920

Ile Lys Phe Ala Glu Pro Ile Ser Leu Phe Val Cys Asp Ala Glu
1925 1930 1935

Leu Ser Val Thr Val Asn Trp Ser Lys Ile Ile Ile Glu Trp Ser
1940 1945 1950

Lys His Val Arg Lys Cys Lys Tyr Cys Ser Ser Val Asn Lys Cys
1955 1960 1965

Met Leu Ile Val Lys Tyr His Ala Gln Asp Asp Ile Asp Phe Lys
1970 1975 1980

Leu Asp Asn Ile Thr Ile Leu Lys Thr Tyr Val Cys Leu Gly Ser
1985 1990 1995

Lys Leu Lys Gly Ser Glu Val Tyr Leu Val Leu Thr Ile Gly Pro
2000 2005 2010

Ala Asn Ile Phe Pro Val Phe Asn Val Val Gln Asn Ala Lys Leu
2015 2020 2025

Ile Leu Ser Arg Thr Lys Asn Phe Ile Met Pro Lys Lys Ala Asp
2030 2035 2040

Lys Glu Ser Ile Asp Ala Asn Ile Lys Ser Leu Ile Pro Phe Leu
2045 2050 2055

Cys Tyr Pro Ile Thr Lys Lys Gly Ile Asn Thr Ala Leu Ser Lys

2060

2065

2070

Leu Lys Ser Val Val Ser Gly Asp Ile Leu Ser Tyr Ser Ile Ala
2075 2080 2085

Gly Arg Asn Glu Val Phe Ser Asn Lys Leu Ile Asn His Lys His
2090 2095 2100

Met Asn Ile Leu Lys Trp Phe Asn His Val Leu Asn Phe Arg Ser
2105 2110 2115

Thr Glu Leu Asn Tyr Asn His Leu Tyr Met Val Glu Ser Thr Tyr
2120 2125 2130

Pro Tyr Leu Ser Glu Leu Leu Asn Ser Leu Thr Thr Asn Glu Leu
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Lys Lys Leu Ile Lys Ile Thr Gly Ser Leu Leu Tyr Asn Phe His
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Asn Glu
2165

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Glu Cys His Leu Asn Ser Pro Ile Val Lys Gly Lys Ile Ala Gln Leu
20 25 30

His Thr Ile Met Ser Leu Pro Gln Pro Tyr Asp Met Asp Asp Asp Ser
35 40 45

Ile Leu Val Ile Thr Arg Gln Lys Ile Lys Leu Asn Lys Leu Asp Lys
50 55 60

Arg Gln Arg Ser Ile Arg Arg Leu Lys Leu Ile Leu Thr Glu Lys Val
65 70 75 80

Asn Asp Leu Gly Lys Tyr Thr Phe Ile Arg Tyr Pro Glu Met Ser Lys
85 90 95

Glu Met Phe Lys Leu His Ile Pro Gly Ile Asn Ser Lys Val Thr Glu
100 105 110

Leu Leu Leu Lys Ala Asp Arg Thr Tyr Ser Gln Met Thr Asp Gly Leu
115 120 125

Arg Asp Leu Trp Ile Asn Val Leu Ser Lys Leu Ala Ser Lys Asn Asp
130 135 140

Gly Ser Asn Tyr Asp Leu Asn Glu Glu Ile Asn Asn Ile Ser Lys Val
145 150 155 160

His Thr Thr Tyr Lys Ser Asp Lys Trp Tyr Asn Pro Phe Lys Thr Trp
165 170 175

Phe Thr Ile Lys Tyr Asp Met Arg Arg Leu Gln Lys Ala Arg Asn Glu
180 185 190

Val Thr Phe Asn Met Gly Lys Asp Tyr Asn Leu Leu Glu Asp Gln Lys
195 200 205

Asn Phe Leu Leu Ile His Pro Glu Leu Val Leu Ile Leu Asp Lys Gln
210 215 220

Asn Tyr Asn Gly Tyr Leu Ile Thr Pro Glu Leu Val Leu Pro Tyr Cys
225 230 235 240

Asp Val Val Glu Gly Arg Trp Asn Ile Ser Ala Cys Ala Lys Leu Asp
245 250 255

Pro Lys Leu Gln Ser Met Tyr Gln Lys Gly Asn Asn Leu Trp Glu Val
260 265 270

Ile Asp Lys Leu Phe Pro Ile Met Gly Glu Lys Thr Phe Asp Val Ile
275 280 285

Ser Leu Leu Glu Pro Leu Ala Leu Ser Leu Ile Gln Thr His Asp Pro
290 295 300

Val Lys Gln Leu Arg Gly Ala Phe Leu Asn His Val Leu Ser Glu Met
305 310 315 320

Glu Leu Ile Phe Glu Ser Arg Glu Ser Ile Lys Glu Phe Leu Ser Val
325 330 335

Asp Tyr Ile Asp Lys Ile Leu Asp Ile Phe Asn Lys Ser Thr Ile Asp
340 345 350

Glu Ile Ala Glu Ile Phe Ser Phe Phe Arg Thr Phe Gly His Pro Pro
355 360 365

Leu Glu Ala Ser Ile Ala Ala Glu Lys Val Arg Lys Tyr Met Tyr Ile
370 375 380

Gly Lys Gln Leu Lys Phe Asp Thr Ile Asn Lys Cys His Ala Ile Phe
385 390 395 400

Cys Thr Ile Ile Ile Asn Gly Tyr Arg Glu Arg His Gly Gly Gln Trp
405 410 415

Pro Pro Val Thr Leu Pro Asp His Ala His Glu Phe Ile Ile Asn Ala
420 425 430

Tyr Gly Ser Asn Ser Ala Ile Ser Tyr Glu Asn Ala Val Asp Tyr Tyr
435 440 445

Gln Ser Phe Ile Gly Ile Lys Phe Asn Lys Phe Ile Glu Pro Gln Leu
450 455 460

Asp Glu Asp Leu Thr Ile Tyr Met Lys Asp Lys Ala Leu Ser Pro Lys
465 470 475 480

Lys Ser Asn Trp Asp Thr Val Ser Pro Ala Ser Asn Leu Leu Tyr Arg
485 490 495

Thr Asn Ala Ser Asn Glu Ser Arg Arg Leu Val Glu Lys Phe Ile Ala
500 505 510

Asp Ser Lys Phe Asp Pro Asn Gln Ile Leu Asp Tyr Val Glu Ser Gly
515 520 525

Asp Trp Leu Asp Asp Pro Glu Phe Asn Ile Ser Tyr Ser Leu Lys Glu
530 535 540

Lys Glu Ile Lys Gln Glu Gly Arg Leu Phe Ala Lys Met Thr Tyr Lys
545 550 555 560

Met Arg Ala Thr Gln Val Leu Ser Glu Thr Leu Leu Ala Asn Asn Ile
565 570 575

Gly Lys Phe Phe Gln Glu Asn Gly Met Val Lys Gly Glu Ile Glu Leu
580 585 590

Leu Lys Arg Leu Thr Thr Ile Ser Ile Ser Gly Val Pro Arg Tyr Asn
595 600 605

Glu Val Tyr Asn Asn Ser Lys Ser His Thr Asp Asp Leu Lys Thr Tyr
610 615 620

Asn Lys Ile Ser Asn Leu Asn Leu Ser Ser Asn Gln Lys Ser Lys Lys
625 630 635 640

Phe Glu Phe Lys Ser Thr Asp Ile Tyr Asn Asp Gly Tyr Glu Thr Val
645 650 655

Ser Cys Phe Leu Thr Thr Asp Leu Lys Lys Tyr Cys Leu Asn Trp Arg
660 665 670

Tyr Glu Ser Thr Ala Leu Phe Gly Glu Thr Cys Asn Gln Ile Phe Gly
675 680 685

Leu Asn Lys Leu Phe Asn Trp Leu His Pro Arg Leu Glu Gly Ser Thr
690 695 700

Ile Tyr Val Gly Asp Pro Tyr Cys Pro Pro Ser Asp Lys Glu His Ile
705 710 715 720

Ser Leu Glu Asp His Pro Asp Ser Gly Phe Tyr Val His Asn Pro Arg
725 730 735

Gly Gly Ile Glu Gly Phe Cys Gln Lys Leu Trp Thr Leu Ile Ser Ile
740 745 750

Ser Ala Ile His Leu Ala Ala Val Arg Ile Gly Val Arg Val Thr Ala
755 760 765

Met Val Gln Gly Asp Asn Gln Ala Ile Ala Val Thr Thr Arg Val Pro
770 775 780

Asn Asn Tyr Asp Tyr Arg Val Lys Lys Glu Ile Val Tyr Lys Asp Val
785 790 795 800

Val Arg Phe Phe Asp Ser Leu Arg Glu Val Met Asp Asp Leu Gly His
805 810 815

Glu Leu Lys Leu Asn Glu Thr Ile Ile Ser Ser Lys Met Phe Ile Tyr
820 825 830

Ser Lys Arg Ile Tyr Tyr Asp Gly Arg Ile Leu Pro Gln Ala Leu Lys
835 840 845

Ala Leu Ser Arg Cys Val Phe Trp Ser Glu Thr Val Ile Asp Glu Thr
850 855 860

Arg Ser Ala Ser Ser Asn Leu Ala Thr Ser Phe Ala Lys Ala Ile Glu
865 870 875 880

Asn Gly Tyr Ser Pro Val Leu Gly Tyr Ala Cys Ser Ile Phe Lys Asn
885 890 895

Ile Gln Gln Leu Tyr Ile Ala Leu Gly Met Asn Ile Asn Pro Thr Ile
900 905 910

Thr Gln Asn Ile Lys Asp Leu Tyr Phe Arg Asn Pro Asn Trp Met Gln
915 920 925

Tyr Ala Ser Leu Ile Pro Ala Ser Val Gly Gly Phe Asn Tyr Met Ala
930 935 940

Met Ser Arg Cys Phe Val Arg Asn Ile Gly Asp Pro Ser Val Ala Ala
945 950 955 960

Leu Ala Asp Ile Lys Arg Phe Ile Lys Ala Asn Leu Leu Asp Arg Ser
965 970 975

Val Leu Tyr Arg Ile Met Asn Gln Glu Pro Gly Glu Ser Ser Phe Leu
980 985 990

Asp Trp Ala Ser Asp Pro Tyr Ser Cys Asn Leu Pro Gln Ser Gln Asn
995 1000 1005

Ile Thr Thr Met Ile Lys Asn Ile Thr Ala Arg Asn Val Leu Gln
1010 1015 1020

Asp Ser Pro Asn Pro Leu Leu Ser Gly Leu Phe Thr Asn Thr Met
1025 1030 1035

Ile Glu Glu Asp Glu Glu Leu Ala Glu Phe Leu Met Asp Arg Lys
1040 1045 1050

Val Ile Leu Pro Arg Val Ala His Asp Ile Leu Asp Asn Ser Leu
1055 1060 1065

Thr Gly Ile Arg Asn Ala Ile Ala Gly Met Leu Asp Thr Thr Lys
1070 1075 1080

Ser Leu Ile Arg Val Gly Ile Asn Arg Gly Gly Leu Thr Tyr Ser
1085 1090 1095

Leu Leu Arg Lys Ile Ser Asn Tyr Asp Leu Val Gln Tyr Glu Thr
1100 1105 1110

Leu Ser Arg Thr Leu Arg Leu Ile Val Ser Asp Lys Ile Arg Tyr
1115 1120 1125

Glu Asp Met Cys Ser Val Asp Leu Ala Ile Ala Leu Arg Gln Lys
1130 1135 1140

Met Trp Ile His Leu Ser Gly Gly Arg Met Ile Ser Gly Leu Glu
1145 1150 1155

Thr Pro Asp Pro Leu Glu Leu Leu Ser Gly Val Ile Ile Thr Gly
1160 1165 1170

Ser Glu His Cys Lys Ile Cys Tyr Ser Ser Asp Gly Thr Asn Pro
1175 1180 1185

Tyr Thr Trp Met Tyr Leu Pro Gly Asn Ile Lys Ile Gly Ser Ala
1190 1195 1200

Glu Thr Gly Ile Ser Ser Leu Arg Val Pro Tyr Phe Gly Ser Val
1205 1210 1215

Thr Asp Glu Arg Ser Glu Ala Gln Leu Gly Tyr Ile Lys Asn Leu
1220 1225 1230

Ser Lys Pro Ala Lys Ala Ala Ile Arg Ile Ala Met Ile Tyr Thr
1235 1240 1245

Trp Ala Phe Gly Asn Asp Glu Ile Ser Trp Met Glu Ala Ser Gln
1250 1255 1260

Ile Ala Gln Thr Arg Ala Asn Phe Thr Leu Asp Ser Leu Lys Ile
1265 1270 1275

Leu Thr Pro Val Ala Thr Ser Thr Asn Leu Ser His Arg Leu Lys
1280 1285 1290

Asp Thr Ala Thr Gln Met Lys Phe Ser Ser Thr Ser Leu Ile Arg
1295 1300 1305

Val Ser Arg Phe Ile Thr Met Ser Asn Asp Asn Met Ser Ile Lys
1310 1315 1320

Glu Ala Asn Glu Thr Lys Asp Thr Asn Leu Ile Tyr Gln Gln Ile
1325 1330 1335

Met Leu Thr Gly Leu Ser Val Phe Glu Tyr Leu Phe Arg Leu Glu
1340 1345 1350

Glu Thr Thr Gly His Asn Pro Ile Val Met His Leu His Ile Glu
1355 1360 1365

Asp Glu Cys Cys Ile Lys Glu Ser Phe Asn Asp Glu His Ile Asn
1370 1375 1380

Pro Glu Ser Thr Leu Glu Leu Ile Arg Tyr Pro Glu Ser Asn Glu
1385 1390 1395

Phe Ile Tyr Asp Lys Asp Pro Leu Lys Asp Val Asp Leu Ser Lys
1400 1405 1410

Leu Met Val Ile Lys Asp His Ser Tyr Thr Ile Asp Met Asn Tyr
1415 1420 1425

Trp Asp Asp Thr Asp Ile Ile His Ala Ile Ser Ile Cys Thr Ala
1430 1435 1440

Ile Thr Ile Ala Asp Thr Met Ser Gln Leu Asp Arg Asp Asn Leu
1445 1450 1455

Lys Glu Ile Ile Val Ile Ala Asn Asp Asp Asp Ile Asn Ser Leu
1460 1465 1470

Ile Thr Glu Phe Leu Thr Leu Asp Ile Leu Val Phe Leu Lys Thr
1475 1480 1485

Phe Gly Gly Leu Leu Val Asn Gln Phe Ala Tyr Thr Leu Tyr Ser
1490 1495 1500

Leu Lys Thr Glu Gly Arg Asp Leu Ile Trp Asp Tyr Ile Met Arg
1505 1510 1515

Thr Leu Arg Asp Thr Ser His Ser Ile Leu Lys Val Leu Ser Asn
1520 1525 1530

Ala Leu Ser His Pro Lys Val Phe Lys Arg Phe Trp Asp Cys Gly
1535 1540 1545

Val Leu Asn Pro Ile Tyr Gly Pro Asn Thr Ala Ser Gln Asp Gln
1550 1555 1560

Ile Lys Leu Ala Leu Ser Ile Cys Glu Tyr Ser Leu Asp Leu Phe
1565 1570 1575

Met Arg Glu Trp Leu Asn Gly Val Ser Leu Glu Ile Tyr Ile Cys
1580 1585 1590

Asp Ser Asp Met Glu Val Ala Asn Asp Arg Lys Gln Ala Phe Ile
1595 1600 1605

Ser Arg His Leu Ser Phe Val Cys Cys Leu Ala Glu Ile Ala Ser
1610 1615 1620

Phe Gly Pro Asn Leu Leu Asn Leu Thr Tyr Leu Glu Arg Leu Asp
1625 1630 1635

Leu Leu Lys Gln Tyr Leu Glu Leu Asn Ile Lys Asp Asp Pro Thr
1640 1645 1650

Leu Lys Tyr Val Gln Ile Ser Gly Leu Leu Ile Lys Ser Phe Pro
1655 1660 1665

Ser Thr Val Thr Tyr Val Arg Lys Thr Ala Ile Lys Tyr Leu Arg
1670 1675 1680

Ile Arg Gly Ile Ser Pro Pro Glu Val Ile Asp Asp Trp Asp Pro
1685 1690 1695

Ile Glu Asp Glu Asn Met Leu Asp Asn Ile Val Lys Thr Ile Asn
1700 1705 1710

Asp Asn Cys Asn Lys Asp Asn Lys Gly Asn Lys Ile Asn Asn Phe
1715 1720 1725

Trp Gly Leu Ala Leu Lys Asn Tyr Gln Val Leu Lys Ile Arg Ser
1730 1735 1740

Ile Thr Ser Asp Ser Asp Asn Asn Asp Arg Ser Asp Ala Ser Thr
1745 1750 1755

Gly Gly Leu Thr Leu Pro Gln Gly Gly Asn Tyr Leu Ser His Gln
1760 1765 1770

Leu Arg Leu Phe Gly Ile Asn Ser Thr Ser Cys Leu Lys Ala Leu
1775 1780 1785

Glu Leu Ser Gln Ile Leu Met Lys Glu Val Asn Lys Asp Gln Asp
1790 1795 1800

Arg Leu Phe Leu Gly Glu Gly Ala Gly Ala Met Leu Ala Cys Tyr
1805 1810 1815

Asp Ala Thr Leu Gly Pro Ala Val Asn Tyr Tyr Asn Ser Gly Leu
1820 1825 1830

Asn Ile Thr Asp Val Ile Gly Gln Arg Glu Leu Lys Ile Phe Pro
1835 1840 1845

Ser Glu Val Ser Leu Val Gly Lys Lys Leu Gly Asn Val Thr Gln
1850 1855 1860

Ile Leu Asn Arg Val Lys Val Leu Phe Asn Gly Asn Pro Asn Ser
1865 1870 1875

Thr Trp Ile Gly Asn Met Glu Cys Glu Thr Leu Ile Trp Ser Glu
1880 1885 1890

Leu Asn Asp Lys Ser Ile Gly Leu Val His Cys Asp Met Glu Gly
1895 1900 1905

Ala Ile Gly Lys Ser Glu Glu Thr Val Leu His Glu His Tyr Ser
1910 1915 1920

Val Ile Arg Ile Thr Tyr Leu Ile Gly Asp Asp Asp Val Val Leu
1925 1930 1935

Ile Ser Lys Ile Ile Pro Thr Ile Thr Pro Asn Trp Ser Arg Ile
1940 1945 1950

Leu Tyr Leu Tyr Lys Leu Tyr Trp Lys Asp Val Ser Ile Ile Ser
1955 1960 1965

Leu Lys Thr Ser Asn Pro Ala Ser Thr Glu Leu Tyr Leu Ile Ser
1970 1975 1980

Lys Asp Ala Tyr Cys Thr Ile Met Glu Pro Ser Glu Val Val Leu
1985 1990 1995

Ser Lys Leu Lys Arg Leu Ser Leu Leu Glu Glu Asn Asn Leu Leu
2000 2005 2010

Lys Trp Ile Ile Leu Ser Lys Lys Lys Asn Asn Glu Trp Leu His
2015 2020 2025

His Glu Ile Lys Glu Gly Glu Arg Asp Tyr Gly Val Met Arg Pro
2030 2035 2040

Tyr His Met Ala Leu Gln Ile Phe Gly Phe Gln Ile Asn Leu Asn
2045 2050 2055

His Leu Ala Lys Glu Phe Leu Ser Thr Pro Asp Leu Thr Asn Ile
2060 2065 2070

Asn Asn Ile Ile Gln Ser Phe Gln Arg Thr Ile Lys Asp Val Leu
2075 2080 2085

Phe Glu Trp Ile Asn Ile Thr His Asp Gly Lys Arg His Lys Leu
2090 2095 2100

Gly Gly Arg Tyr Asn Ile Phe Pro Leu Lys Asn Lys Gly Lys Leu
2105 2110 2115

Arg Leu Leu Ser Arg Arg Leu Val Leu Ser Trp Ile Ser Leu Ser
2120 2125 2130

Leu Ser Thr Arg Leu Leu Thr Gly Arg Phe Pro Asp Glu Lys Phe
2135 2140 2145

Glu His Arg Ala Gln Thr Gly Tyr Val Ser Leu Pro Asp Thr Asp
2150 2155 2160

Leu Glu Ser Leu Lys Leu Leu Ser Lys Asn Thr Ile Lys Asn Tyr
2165 2170 2175

Arg Glu Cys Ile Gly Ser Ile Ser Tyr Trp Phe Leu Thr Lys Glu
2180 2185 2190

Val Lys Ile Leu Met Lys Leu Ile Gly Gly Ala Lys Leu Leu Gly
2195 2200 2205

Ile Pro Arg Gln Tyr Lys Glu Pro Glu Glu Gln Leu Leu Glu Asp
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Tyr Asn Gln His Asp Glu Phe Asp Ile Asp
2225 2230

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Glu Cys His Leu Asn Ser Pro Ile Val Lys Ser Lys Ile Ala Gln Leu
20 25 30

His Val Leu Leu Asp Ile Asn Gln Pro Tyr Asp Leu Lys Asp Asn Ser
35 40 45

Ile Ile Asn Ile Thr Lys Tyr Lys Ile Arg Asn Gly Gly Leu Ser Pro
50 55 60

Arg Gln Ile Lys Ile Arg Ser Leu Gly Lys Ile Leu Lys Gln Glu Ile
65 70 75 80

Lys Asp Ile Asp Arg Tyr Thr Phe Glu Pro Tyr Pro Ile Phe Ser Leu
85 90 95

Glu Leu Leu Arg Leu Asp Ile Pro Glu Ile Cys Asp Lys Ile Arg Ser
100 105 110

Ile Phe Ser Val Ser Asp Arg Leu Ile Arg Glu Leu Ser Ser Gly Phe
115 120 125

Gln Glu Leu Trp Leu Asn Ile Leu Arg Gln Leu Gly Cys Val Glu Gly
130 135 140

Lys Glu Gly Phe Asp Ser Leu Lys Asp Val Asp Ile Ile Pro Asp Ile
145 150 155 160

Thr Asp Lys Tyr Asn Lys Asn Thr Trp Tyr Arg Pro Phe Leu Thr Trp
165 170 175

Phe Ser Ile Lys Tyr Asp Met Arg Trp Met Gln Lys Asn Lys Ser Gly
180 185 190

Asn His Leu Asp Val Ser Asn Ser His Asn Phe Leu Asp Cys Lys Ser
195 200 205

Tyr Ile Leu Ile Ile Tyr Arg Asp Leu Val Ile Ile Ile Asn Lys Leu
210 215 220

Lys Leu Thr Gly Tyr Val Leu Thr Pro Glu Leu Val Leu Met Tyr Cys
225 230 235 240

Asp Val Val Glu Gly Arg Trp Asn Met Ser Ser Ala Gly Arg Leu Asp
245 250 255

Lys Arg Ser Ser Lys Ile Thr Cys Lys Gly Glu Glu Leu Trp Glu Leu
260 265 270

Ile Asp Ser Leu Phe Pro Asn Leu Gly Glu Asp Val Tyr Asn Ile Ile
275 280 285

Ser Leu Leu Glu Pro Leu Ser Leu Ala Leu Ile Gln Leu Asp Asp Pro
290 295 300

Val Thr Asn Leu Lys Gly Ala Phe Met Arg His Val Leu Thr Glu Leu
305 310 315 320

His Thr Ile Leu Ile Lys Asp Asn Ile Tyr Thr Asp Ser Glu Ala Asp
325 330 335

Ser Ile Met Glu Ser Leu Ile Lys Ile Phe Arg Glu Thr Ser Ile Asp
340 345 350

Glu Lys Ala Glu Ile Phe Ser Phe Phe Arg Thr Phe Gly His Pro Ser
355 360 365

Leu Glu Ala Ile Thr Ala Ala Asp Lys Val Arg Thr His Met Tyr Ser
370 375 380

Ser Lys Lys Ile Ile Leu Lys Thr Leu Tyr Glu Cys His Ala Ile Phe
385 390 395 400

Cys Ala Ile Ile Ile Asn Gly Tyr Arg Glu Arg His Gly Gly Gln Trp
405 410 415

Pro Pro Cys Glu Phe Pro Asn His Val Cys Leu Glu Leu Lys Asn Ala
420 425 430

Gln Gly Ser Asn Ser Ala Ile Ser Tyr Glu Cys Ala Val Asp Asn Tyr
435 440 445

Ser Ser Phe Ile Gly Phe Lys Phe Leu Lys Phe Ile Glu Pro Gln Leu
450 455 460

Asp Glu Asp Leu Thr Ile Tyr Met Lys Asp Lys Ala Leu Ser Pro Arg
465 470 475 480

-- Lys Ala Ala Trp Asp Ser Val Tyr Pro Asp Ser Asn Leu Tyr Tyr Lys
485 490 495

Val Pro Glu Ser Glu Glu Thr Arg Arg Leu Ile Glu Val Phe Ile Asn
500 505 510

Asp Asn Asn Phe Asn Pro Ala Asp Ile Ile Asn Tyr Val Glu Ser Gly
515 520 525

Glu Trp Leu Asn Asp Asp Ser Phe Asn Ile Ser Tyr Ser Leu Lys Glu
530 535 540

Lys Glu Ile Lys Gln Glu Gly Arg Leu Phe Ala Lys Met Thr Tyr Lys
545 550 555 560

Met Arg Ala Val Gln Val Leu Ala Glu Thr Leu Leu Ala Lys Gly Val
565 570 575

Gly Glu Leu Phe Ser Glu Asn Gly Met Val Lys Gly Glu Ile Asp Leu
580 585 590

Leu Lys Arg Leu Thr Thr Leu Ser Val Ser Gly Val Pro Arg Ser Asn
595 600 605

Ser Val Tyr Asn Asn Pro Ile Leu His Glu Lys Leu Ile Lys Asn Met
610 615 620

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|-----|-----|-----|-----|-----|------|------|-----|------|-----|-----|-----|-----|-----|-----|-----|
| Asn | Lys | Cys | Asn | Ser | Asn | Gly | Tyr | Trp | Asp | Glu | Arg | Lys | Lys | Ser | Lys |
| 625 | | | | | | | | | | | | | | | 640 |
| | | | | | | | | | | | | | | | |
| Asn | Glu | Phe | Lys | Ala | Ala | Asp | Ser | Ser | Thr | Glu | Gly | Tyr | Glu | Thr | Leu |
| | | | 645 | | | | | | 650 | | | | | | 655 |
| | | | | | | | | | | | | | | | |
| Ser | Cys | Phe | Leu | Thr | Thr | Asp | Leu | Lys | Lys | Tyr | Cys | Leu | Asn | Trp | Arg |
| | | | | 660 | | | | 665 | | | | | 670 | | |
| | | | | | | | | | | | | | | | |
| Phe | Glu | Ser | Thr | Ala | Leu | Phe | Gly | Gln | Arg | Cys | Asn | Glu | Ile | Phe | Gly |
| | | | | 675 | | | 680 | | | | | | 685 | | |
| | | | | | | | | | | | | | | | |
| Phe | Lys | Thr | Phe | Phe | Asn | Trp | Met | His | Pro | Ile | Leu | Glu | Lys | Ser | Thr |
| | | | | 690 | | | 695 | | | | | | 700 | | |
| | | | | | | | | | | | | | | | |
| Ile | Tyr | Val | Gly | Asp | Pro | Tyr | Cys | Pro | Val | Pro | Asp | Arg | Met | His | Lys |
| | | | | 705 | | | 710 | | | 715 | | | 720 | | |
| | | | | | | | | | | | | | | | |
| Glu | Leu | Gln | Asp | His | -Asp | -Asp | Thr | -Gly | Ile | Phe | Ile | His | Asn | Pro | Arg |
| | | | | 725 | | | 730 | | | | | | 735 | | |
| | | | | | | | | | | | | | | | |
| Gly | Gly | Ile | Glu | Gly | Tyr | Cys | Gln | Lys | Leu | Trp | Thr | Leu | Ile | Ser | Ile |
| | | | | 740 | | | 745 | | | | | | 750 | | |
| | | | | | | | | | | | | | | | |
| Ser | Ala | Ile | His | Leu | Ala | Ala | Val | Lys | Val | Gly | Val | Arg | Val | Ser | Ala |
| | | | | 755 | | | 760 | | | | | | 765 | | |
| | | | | | | | | | | | | | | | |
| Met | Val | Gln | Gly | Asp | Asn | Gln | Ala | Ile | Ala | Val | Thr | Ser | Arg | Val | Pro |
| | | | | 770 | | | 775 | | | | | | 780 | | |
| | | | | | | | | | | | | | | | |
| Val | Thr | Gln | Thr | Tyr | Lys | Gln | Lys | Lys | Thr | His | Val | Tyr | Glu | Ile | |
| | | | | 785 | | | 790 | | | 795 | | | 800 | | |
| | | | | | | | | | | | | | | | |
| Thr | Arg | Tyr | Phe | Gly | Ala | Leu | Arg | Glu | Val | Met | Phe | Asp | Ile | Gly | His |
| | | | | 805 | | | 810 | | | | | | 815 | | |
| | | | | | | | | | | | | | | | |
| Glu | Leu | Lys | Leu | Asn | Glu | Thr | Ile | Ile | Ser | Ser | Lys | Met | Phe | Val | Tyr |
| | | | | 820 | | | 825 | | | | | | 830 | | |
| | | | | | | | | | | | | | | | |
| Ser | Lys | Arg | Ile | Tyr | Tyr | Asp | Gly | Lys | Ile | Leu | Pro | Gln | Cys | Leu | Lys |
| | | | | 835 | | | 840 | | | | | | 845 | | |
| | | | | | | | | | | | | | | | |
| Ala | Leu | Thr | Arg | Cys | Val | Phe | Trp | Ser | Glu | Thr | Leu | Val | Asp | Glu | Asn |
| | | | | 850 | | | 855 | | | | | | 860 | | |

Arg Ser Ala Cys Ser Asn Ile Ala Thr Ser Ile Ala Lys Ala Ile Glu
 865 870 875 880

Asn Gly Tyr Ser Pro Ile Leu Gly Tyr Cys Ile Ala Leu Phe Lys Thr
 885 890 895

Cys Gln Gln Val Cys Ile Ser Leu Gly Met Thr Ile Asn Pro Thr Ile
 900 905 910

Thr Ser Thr Ile Lys Asp Gln Tyr Phe Lys Gly Lys Asn Trp Leu Arg
 915 920 925

Cys Ala Ile Leu Ile Pro Ala Asn Ile Gly Gly Phe Asn Tyr Met Ser
 930 935 940

Thr Ala Arg Cys Phe Val Arg Asn Ile Gly Asp Pro Ala Val Ala Ala
 945 950 955 960

Leu Ala Asp Leu Lys Arg Phe Ile Lys Ala Gly Leu Leu Asp Lys Gln
 965 970 975

Val Leu Tyr Arg Val Met Asn Gln Glu Pro Gly Asp Ser Ser Phe Leu
 980 985 990

Asp Trp Ala Ser Asp Pro Tyr Ser Cys Asn Leu Pro His Ser Gln Ser
 995 1000 1005

Ile Thr Thr Ile Ile Lys Asn Val Thr Ala Arg Ser Val Leu Gln
 1010 1015 1020

Glu Ser Pro Asn Pro Leu Leu Ser Gly Leu Phe Ser Glu Ser Ser
 1025 1030 1035

Ser Glu Glu Asp Leu Asn Leu Ala Ser Phe Leu Met Asp Arg Lys
 1040 1045 1050

Ala Ile Leu Pro Arg Val Ala His Glu Ile Leu Asp Asn Ser Leu
 1055 1060 1065

Thr Gly Val Arg Glu Ala Ile Ala Gly Met Leu Asp Thr Thr Lys
 1070 1075 1080

Ser Leu Val Arg Ala Ser Val Arg Arg Gly Gly Leu Ser Tyr Ser
 1085 1090 1095

Ile Leu Arg Arg Leu Ile Asn Tyr Asp Leu Leu Gln Tyr Glu Thr
1100 1105 1110

Leu Thr Arg Thr Leu Arg Lys Pro Val Lys Asp Asn Ile Glu Tyr
1115 1120 1125

Glu Tyr Met Cys Ser Val Glu Leu Ala Ile Gly Leu Arg Gln Lys
1130 1135 1140

Met Trp Phe His Leu Thr Tyr Gly Arg Pro Ile His Gly Leu Glu
1145 1150 1155

Thr Pro Asp Pro Leu Glu Leu Leu Arg Gly Ser Phe Ile Glu Gly
1160 1165 1170

Ser Glu Ile Cys Lys Phe Cys Arg Ser Glu Gly Asn Asn Pro Met
1175 1180 1185

Tyr Thr Trp Phe Tyr Leu Pro Asp Asn Ile Asp Leu Asp Thr Leu
1190 1195 1200

Ser Asn Gly Ser Pro Ala Ile Arg Ile Pro Tyr Phe Gly Ser Ala
1205 1210 1215

Thr Asp Glu Arg Ser Glu Ala Gln Leu Gly Tyr Val Lys Asn Leu
1220 1225 1230

Ser Lys Pro Ala Lys Ala Ala Ile Arg Ile Ala Met Val Tyr Thr
1235 1240 1245

Trp Ala Tyr Gly Thr Asp Glu Ile Ser Trp Met Glu Ala Ala Leu
1250 1255 1260

Ile Ala Gln Thr Arg Ala Asn Leu Ser Leu Glu Asn Leu Lys Leu
1265 1270 1275

Leu Thr Pro Val Ser Thr Ser Thr Asn Leu Ser His Arg Leu Arg
1280 1285 1290

Asp Thr Ala Thr Gln Met Lys Phe Ser Ser Ala Thr Leu Val Arg
1295 1300 1305

Ala Ser Arg Phe Ile Thr Ile Ser Asn Asp Asn Met Ala Leu Lys
1310 1315 1320

Glu Ala Gly Glu Ser Lys Asp Thr Asn Leu Val Tyr Gln Gln Ile
1325 1330 1335

Met Leu Thr Gly Leu Ser Leu Phe Glu Phe Asn Met Arg Tyr Lys
1340 1345 1350

Gln Gly Ser Leu Ser Lys Pro Met Ile Leu His Leu His Leu Asn
1355 1360 1365

Asn Lys Cys Cys Ile Ile Glu Ser Pro Gln Glu Leu Asn Ile Pro
1370 1375 1380

Pro Arg Ser Thr Leu Asp Leu Glu Ile Thr Gln Glu Asn Asn Lys
1385 1390 1395

Leu Ile Tyr Asp Pro Asp Pro Leu Lys Asp Ile Asp Leu Glu Leu
1400 1405 1410

Phe Ser Lys Val Arg Asp Val Val His Thr Ile Asp Met Asn Tyr
1415 1420 1425

Trp Ser Asp Asp Glu Ile Ile Arg Ala Thr Ser Ile Cys Thr Ala
1430 1435 1440

Met Thr Ile Ala Asp Thr Met Ser Gln Leu Asp Arg Asp Asn Leu
1445 1450 1455

Lys Glu Met Ile Ala Leu Ile Asn Asp Asp Asp Ile Asn Ser Leu
1460 1465 1470

Ile Thr Glu Phe Met Val Ile Asp Ile Pro Leu Phe Cys Ser Thr
1475 1480 1485

Phe Gly Gly Ile Leu Ile Asn Gln Phe Ala Tyr Ser Leu Tyr Gly
1490 1495 1500

Leu Asn Val Arg Gly Arg Asp Glu Ile Trp Gly Tyr Val Ile Arg
1505 1510 1515

Ile Ile Lys Asp Thr Ser His Ala Val Leu Lys Val Leu Ser Asn
1520 1525 1530

Ala Leu Ser His Pro Lys Ile Phe Lys Arg Phe Trp Asp Ala Gly
1535 1540 1545

Val Val Glu Pro Val Tyr Gly Pro Asn Leu Ser Asn Gln Asp Lys
1550 1555 1560

Ile Leu Leu Ala Ile Ser Val Cys Glu Tyr Ser Val Asp Leu Phe
1565 1570 1575

Met Arg Asp Trp Gln Glu Gly Ile Pro Leu Glu Ile Phe Ile Cys
1580 1585 1590

Asp Asn Asp Pro Asn Ile Ala Glu Met Arg Lys Leu Ser Phe Leu
1595 1600 1605

Ala Arg His Leu Ala Tyr Leu Cys Ser Leu Ala Glu Ile Ala Lys
1610 1615 1620

Glu Gly Pro Lys Leu Glu Ser Met Thr Ser Leu Glu Arg Leu Glu
1625 1630 1635

Ser Leu Lys Glu Tyr Leu Glu Leu Thr Phe Leu Asp Asp Pro Ile
1640 1645 1650

Leu Arg Tyr Ser Gln Leu Thr Gly Leu Val Ile Lys Ile Phe Pro
1655 1660 1665

Ser Thr Leu Thr Tyr Ile Arg Lys Ser Ser Ile Lys Val Leu Arg
1670 1675 1680

Val Arg Gly Ile Gly Ile Pro Glu Val Leu Glu Asp Trp Asp Pro
1685 1690 1695

Asp Ala Asp Ser Met Leu Leu Asp Asn Ile Thr Ala Glu Val Gln
1700 1705 1710

His Asn Ile Pro Leu Lys Lys Asn Glu Arg Thr Pro Phe Trp Gly
1715 1720 1725

Leu Arg Val Ser Lys Ser Gln Val Leu Arg Leu Arg Gly Tyr Glu
1730 1735 1740

Glu Ile Lys Arg Glu Glu Arg Gly Arg Ser Gly Val Gly Leu Thr
1745 1750 1755

Leu Pro Phe Asp Gly Arg Tyr Leu Ser His Gln Leu Arg Leu Phe
1760 1765 1770

Gly Ile Asn Ser Thr Ser Cys Leu Lys Ala Leu Glu Leu Thr Tyr
1775 1780 1785

Leu Leu Asn Pro Leu Val Asn Lys Asp Lys Asp Arg Leu Tyr Leu
1790 1795 1800

Gly Glu Gly Ala Gly Ala Met Leu Ser Cys Tyr Asp Ala Thr Leu
1805 1810 1815

Gly Pro Cys Met Asn Tyr Tyr Asn Ser Gly Val Asn Ser Cys Asp
1820 1825 1830

Leu Asn Gly Gln Arg Glu Leu Asn Ile Tyr Pro Ser Glu Val Ala
1835 1840 1845

Leu Val Gly Lys Lys Leu Asn Asn Val Thr Ser Leu Cys Gln Arg
1850 1855 1860

Val Lys Val Leu Phe Asn Gly Asn Pro Gly Ser Thr Trp Ile Gly
1865 1870 1875

Asn Asp Glu Cys Glu Thr Leu Ile Trp Asn Glu Leu Gln Asn Asn
1880 1885 1890

Ser Ile Gly Phe Ile His Cys Asp Met Glu Gly Gly Glu His Lys
1895 1900 1905

Cys Asp Gln Val Val Leu His Glu His Tyr Ser Val Ile Arg Ile
1910 1915 1920

Ala Tyr Leu Val Gly Asp Lys Asp Val Ile Leu Val Ser Lys Ile
1925 1930 1935

Ala Pro Arg Leu Gly Thr Asp Trp Thr Lys Gln Leu Ser Leu Tyr
1940 1945 1950

Leu Arg Tyr Trp Arg Asp Val Ser Leu Ile Val Leu Lys Thr Ser
1955 1960 1965

Asn Pro Ala Ser Thr Glu Met Tyr Leu Ile Ser Lys Asp Pro Lys
1970 1975 1980

Ser Asp Ile Ile Glu Asp Ser Asn Thr Val Leu Ala Asn Leu Leu
1985 1990 1995

Pro Leu Ser Lys Glu Asp Ser Ile Lys Ile Glu Lys Trp Ile Leu
2000 2005 2010

Val Glu Lys Ala Lys Val His Asp Trp Ile Val Arg Glu Leu Lys
2015 2020 2025

Glu Gly Ser Ala Ser Ser Gly Met Leu Arg Pro Tyr His Gln Ala
2030 2035 2040

Leu Gln Ile Phe Gly Phe Glu Pro Asn Leu Asn Lys Leu Cys Arg
2045 2050 2055

Asp Phe Leu Ser Thr Leu Asn Ile Val Asp Thr Lys Asn Cys Ile
2060 2065 2070

Ile Thr Phe Asp Arg Val Leu Arg Asp Thr Ile Phe Glu Trp Thr
2075 2080 2085

Arg Ile Lys Asp Ala Asp Lys Lys Leu Arg Leu Thr Gly Lys Tyr
2090 2095 2100

Asp Leu Tyr Pro Leu Arg Asp Ser Gly Lys Leu Lys Val Ile Ser
2105 2110 2115

Arg Arg Leu Val Ile Ser Trp Ile Ala Leu Ser Met Ser Thr Arg
2120 2125 2130

Leu Val Thr Gly Ser Phe Pro Asp Ile Lys Phe Glu Ser Arg Leu
2135 2140 2145

Gln Leu Gly Ile Val Ser Ile Ser Ser Arg Glu Ile Lys Asn Leu
2150 2155 2160

Arg Val Ile Ser Lys Ile Val Ile Asp Lys Phe Glu Asp Ile Ile
2165 2170 2175

His Ser Val Thr Tyr Arg Phe Leu Thr Lys Glu Ile Lys Ile Leu
2180 2185 2190

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20 25 30

His Thr Ile Met Ser Leu Pro Gln Pro Tyr Asp Met Asp Asp Asp Ser
35 40 45

Ile Leu Ile Ile Thr Arg Gln Lys Ile Lys Leu Asn Lys Leu Asp Lys
50 55 60

Arg Gln Arg Ser Ile Arg Lys Leu Arg Ser Val Leu Met Glu Arg Val
65 70 75 80

Ser Asp Leu Gly Lys Tyr Thr Phe Ile Arg Tyr Pro Glu Met Ser Ser
85 90 95

Glu Met Phe Gln Leu Cys Ile Pro Gly Ile Asn Asn Lys Ile Asn Glu
100 105 110

Leu Leu Ser Lys Ala Ser Lys Thr Tyr Asn Gln Met Thr Asp Gly Leu
115 120 125

Arg Asp Leu Trp Val Thr Ile Leu Ser Lys Leu Ala Ser Lys Asn Asp
130 135 140

Gly Ser Asn Tyr Asp Ile Asn Glu Asp Ile Ser Asn Ile Ser Asn Val
145 150 155 160

His Met Thr Tyr Gln Ser Asp Lys Trp Tyr Asn Pro Phe Lys Thr Trp
165 170 175

Phe Thr Ile Lys Tyr Asp Met Arg Arg Leu Gln Lys Ala Lys Asn Glu
180 185 190

Ile Thr Phe Asn Arg His Lys Asp Tyr Asn Leu Leu Glu Asp Gln Lys
195 200 205

Asn Ile Leu Leu Ile His Pro Glu Leu Val Leu Ile Leu Asp Lys Gln
210 215 220

Asn Tyr Asn Gly Tyr Ile Met Thr Pro Glu Leu Val Leu Met Tyr Cys
225 230 235 240

Asp Val Val Glu Gly Arg Trp Asn Ile Ser Ser Cys Ala Lys Leu Asp
245 250 255

Pro Lys Leu Gln Ser Met Tyr Tyr Lys Gly Asn Asn Leu Trp Glu Ile
260 265 270

Ile Asp Gly Leu Phe Ser Thr Leu Gly Glu Arg Thr Phe Asp Ile Ile
275 280 285

Ser Leu Leu Glu Pro Leu Ala Leu Ser Leu Ile Gln Thr Tyr Asp Pro
290 295 300

Val Lys Gln Leu Arg Gly Ala Phe Leu Asn His Val Leu Ser Glu Met
305 310 315 320

Glu Leu Ile Phe Ala Ala Glu Cys Thr Thr Glu Glu Ile Pro Asn Val
325 330 335

Asp Tyr Ile Asp Lys Ile Leu Asp Val Phe Lys Glu Ser Thr Ile Asp
340 345 350

Glu Ile Ala Glu Ile Phe Ser Phe Phe Arg Thr Phe Gly His Pro Pro
355 360 365

Leu Glu Ala Ser Ile Ala Ala Glu Lys Val Arg Lys Tyr Met Tyr Thr
370 375 380

Glu Lys Cys Leu Lys Phe Asp Thr Ile Asn Lys Cys His Ala Ile Phe
385 390 395 400

Cys Thr Ile Ile Ile Asn Gly Tyr Arg Glu Arg His Gly Gly Gln Trp
405 410 415

Pro Pro Val Thr Leu Pro Val His Ala His Glu Phe Ile Ile Asn Ala
420 425 430

Tyr Gly Ser Asn Ser Ala Ile Ser Tyr Glu Asn Ala Val Asp Tyr Tyr
435 440 445

Lys Ser Phe Ile Gly Ile Lys Phe Asp Lys Phe Ile Glu Pro Gln Leu
450 455 460

Asp Glu Asp Leu Thr Ile Tyr Met Lys Asp Lys Ala Leu Ser Pro Lys
465 470 475 480

Lys Ser Asn Trp Asp Thr Val Tyr Pro Ala Ser Asn Leu Leu Tyr Arg
485 490 495

Thr Asn Val Ser His Asp Ser Arg Arg Leu Val Glu Val Phe Ile Ala
500 505 510

Asp Ser Lys Phe Asp Pro His Gln Val Leu Asp Tyr Val Glu Ser Gly
515 520 525

Tyr Trp Leu Asp Asp Pro Glu Phe Asn Ile Ser Tyr Ser Leu Lys Glu
530 535 540

Lys Glu Ile Lys Gln Glu Gly Arg Leu Phe Ala Lys Met Thr Tyr Lys
545 550 555 560

Met Arg Ala Thr Gln Val Leu Ser Glu Thr Leu Leu Ala Asn Asn Ile
565 570 575

Gly Lys Phe Phe Gln Glu Asn Gly Met Val Lys Gly Glu Ile Glu Leu
580 585 590

Leu Lys Arg Leu Thr Thr Ile Ser Met Ser Gly Val Pro Arg Tyr Asn
595 600 605

Glu Val Tyr Asn Asn Ser Lys Ser His Thr Glu Glu Leu Gln Ala Tyr
610 615 620

Asn Ala Ile Ser Ser Asn Leu Ser Ser Asn Gln Lys Ser Lys Lys
625 630 635 640

Phe Glu Phe Lys Ser Thr Asp Ile Tyr Asn Asp Gly Tyr Glu Thr Val
645 650 655

Ser Cys Phe Leu Thr Thr Asp Leu Lys Lys Tyr Cys Leu Asn Trp Arg
660 665 670

Tyr Glu Ser Thr Ala Leu Phe Gly Asp Thr Cys Asn Gln Ile Phe Gly
675 680 685

Leu Lys Glu Leu Phe Asn Trp Leu His Pro Arg Leu Glu Lys Ser Thr
690 695 700

Ile Tyr Val Gly Asp Pro Tyr Cys Pro Pro Ser Asp Ile Glu His Leu
705 710 715 720

Pro Leu Asp Asp His Pro Asp Ser Gly Phe Tyr Val His Asn Pro Lys
725 730 735

Gly Gly Ile Glu Gly Phe Cys Gln Lys Leu Trp Thr Leu Ile Ser Ile
740 745 750

Ser Ala Ile His Leu Ala Ala Val Lys Ile Gly Val Arg Val Thr Ala
755 760 765

Met Val Gln Gly Asp Asn Gln Ala Ile Ala Val Thr Thr Arg Val Pro
770 775 780

Asn Asn Tyr Asp Tyr Lys Val Lys Lys Glu Ile Val Tyr Lys Asp Val
785 790 795 800

Val Arg Phe Phe Asp Ser Leu Arg Glu Val Met Asp Asp Leu Gly His
805 810 815

Glu Leu Lys Leu Asn Glu Thr Ile Ile Ser Ser Lys Met Phe Ile Tyr
820 825 830

Ser Lys Arg Ile Tyr Tyr Asp Gly Arg Ile Leu Pro Gln Ala Leu Lys
835 840 845

Ala Leu Ser Arg Cys Val Phe Trp Ser Glu Thr Ile Ile Asp Glu Thr
850 855 860

Arg Ser Ala Ser Ser Asn Leu Ala Thr Ser Phe Ala Lys Ala Ile Glu
865 870 875 880

Asn Gly Tyr Ser Pro Val Leu Gly Tyr Val Cys Ser Ile Phe Lys Asn
885 890 895

Ile Gln Gln Leu Tyr Ile Ala Leu Gly Met Asn Ile Asn Pro Thr Ile
900 905 910

Thr Gln Asn Ile Lys Asp Gln Tyr Phe Arg Asn Ile His Trp Met Gln
915 920 925

Tyr Ala Ser Leu Ile Pro Ala Ser Val Gly Gly Phe Asn Tyr Met Ala
930 935 940

Met Ser Arg Cys Phe Val Arg Asn Ile Gly Asp Pro Thr Val Ala Ala
945 950 955 960

Leu Ala Asp Ile Lys Arg Phe Ile Lys Ala Asn Leu Leu Asp Arg Gly
965 970 975

Val Leu Tyr Arg Ile Met Asn Gln Glu Pro Gly Glu Ser Ser Phe Leu
980 985 990

Asp Trp Ala Ser Asp Pro Tyr Ser Cys Asn Leu Pro Gln Ser Gln Asn
995 1000 1005

Ile Thr Thr Met Ile Lys Asn Ile Thr Ala Arg Asn Val Leu Gln
1010 1015 1020

Asp Ser Pro Asn Pro Leu Leu Ser Gly Leu Phe Thr Ser Thr Met
1025 1030 1035

Ile Glu Glu Asp Glu Glu Leu Ala Glu Phe Leu Met Asp Arg Arg
1040 1045 1050

Ile Ile Leu Pro Arg Val Ala His Asp Ile Leu Asp Asn Ser Leu
1055 1060 1065

Thr Gly Ile Arg Asn Ala Ile Ala Gly Met Leu Asp Thr Thr Lys
1070 1075 1080

Ser Leu Ile Arg Val Gly Ile Ser Arg Gly Gly Leu Thr Tyr Asn
1085 1090 1095

Leu Leu Arg Lys Ile Ser Asn Tyr Asp Leu Val Gln Tyr Glu Thr
1100 1105 1110

Leu Ser Lys Thr Leu Arg Leu Ile Val Ser Asp Lys Ile Lys Tyr
1115 1120 1125

Glu Asp Met Cys Ser Val Asp Leu Ala Ile Ser Leu Arg Gln Lys
1130 1135 1140

Met Trp Met His Leu Ser Gly Gly Arg Met Ile Asn Gly Leu Glu
1145 1150 1155

Thr Pro Asp Pro Leu Glu Leu Leu Ser Gly Val Ile Ile Thr Gly
1160 1165 1170

Ser Glu His Cys Arg Ile Cys Tyr Ser Thr Glu Gly Glu Ser Pro
1175 1180 1185

Tyr Thr Trp Met Tyr Leu Pro Gly Asn Leu Asn Ile Gly Ser Ala
1190 1195 1200

Glu Thr Gly Ile Ala Ser Leu Arg Val Pro Tyr Phe Gly Ser Val
1205 1210 1215

Thr Asp Glu Arg Ser Glu Ala Gln Leu Gly Tyr Ile Lys Asn Leu
1220 1225 1230

Ser Lys Pro Ala Lys Ala Ala Ile Arg Ile Ala Met Ile Tyr Thr
1235 1240 1245

Trp Ala Phe Gly Asn Asp Glu Ile Ser Trp Met Glu Ala Ser Gln
1250 1255 1260

Ile Ala Gln Thr Arg Ala Asn Phe Thr Leu Asp Ser Leu Lys Ile
1265 1270 1275

Leu Thr Pro Val Thr Thr Ser Thr Asn Leu Ser His Arg Leu Lys
1280 1285 1290

Asp Thr Ala Thr Gln Met Lys Phe Ser Ser Thr Ser Leu Ile Arg
1295 1300 1305

Val Ser Arg Phe Ile Thr Ile Ser Asn Asp Asn Met Ser Ile Lys
1310 1315 1320

Glu Ala Asn Glu Thr Lys Asp Thr Asn Leu Ile Tyr Gln Gln Val
1325 1330 1335

Met Leu Thr Gly Leu Ser Val Phe Glu Tyr Leu Phe Arg Leu Glu
1340 1345 1350

Glu Ser Thr Gly His Asn Pro Met Val Met His Leu His Ile Glu
1355 1360 1365

Asp Gly Cys Cys Ile Lys Glu Ser Tyr Asn Asp Glu His Ile Asn
1370 1375 1380

Pro Glu Ser Thr Leu Glu Leu Ile Lys Tyr Pro Glu Ser Asn Glu
1385 1390 1395

Phe Ile Tyr Asp Lys Asp Pro Leu Lys Asp Ile Asp Leu Ser Lys
1400 1405 1410

Leu Met Val Ile Arg Asp His Ser Tyr Thr Ile Asp Met Asn Tyr
1415 1420 1425

Trp Asp Asp Thr Asp Ile Val His Ala Ile Ser Ile Cys Thr Ala
1430 1435 1440

Val Thr Ile Ala Asp Thr Met Ser Gln Leu Asp Arg Asp Asn Leu
1445 1450 1455

Lys Glu Leu Val Val Ile Ala Asn Asp Asp Asp Ile Asn Ser Leu
1460 1465 1470

Ile Thr Glu Phe Leu Thr Leu Asp Ile Leu Val Phe Leu Lys Thr
1475 1480 1485

Phe Gly Gly Leu Leu Val Asn Gln Phe Ala Tyr Thr Leu Tyr Gly
1490 1495 1500

Leu Lys Ile Glu Gly Arg Asp Pro Ile Trp Asp Tyr Ile Met Arg
1505 1510 1515

Thr Leu Lys Asp Thr Ser His Ser Val Leu Lys Val Leu Ser Asn
1520 1525 1530

Ala Leu Ser His Pro Lys Val Phe Lys Arg Phe Trp Asp Cys Gly
1535 1540 1545

Val Leu Asn Pro Ile Tyr Gly Pro Asn Thr Ala Ser Gln Asp Gln
1550 1555 1560

Val Lys Leu Ala Leu Ser Ile Cys Glu Tyr Ser Leu Asp Leu Phe
1565 1570 1575

Met Arg Glu Trp Leu Asn Gly Ala Ser Leu Glu Ile Tyr Ile Cys
1580 1585 1590

Asp Ser Asp Met Glu Ile Ala Asn Asp Arg Arg Gln Ala Phe Leu
1595 1600 1605

Ser Arg His Leu Ala Phe Val Cys Cys Leu Ala Glu Ile Ala Ser
1610 1615 1620

Phe Gly Pro Asn Leu Leu Asn Leu Thr Tyr Leu Glu Arg Leu Asp
1625 1630 1635

Glu Leu Lys Gln Tyr Leu Asp Leu Asn Ile Lys Glu Asp Pro Thr
1640 1645 1650

Leu Lys Tyr Val Gln Val Ser Gly Leu Leu Ile Lys Ser Phe Pro
1655 1660 1665

Ser Thr Val Thr Tyr Val Arg Lys Thr Ala Ile Lys Tyr Leu Arg
1670 1675 1680

Ile Arg Gly Ile Asn Pro Pro Glu Thr Ile Glu Asp Trp Asp Pro
1685 1690 1695

Ile Glu Asp Glu Asn Ile Leu Asp Asn Ile Val Lys Thr Val Asn
1700 1705 1710

Asp Asn Cys Ser Asp Asn Gln Lys Arg Asn Lys Ser Ser Tyr Phe
1715 1720 1725

Trp Gly Leu Ala Leu Lys Asn Tyr Gln Val Val Lys Ile Arg Ser
1730 1735 1740

Ile Thr Ser Asp Ser Glu Val Asn Glu Ala Ser Asn Val Thr Thr
1745 1750 1755

His Gly Met Thr Leu Pro Gln Gly Gly Ser Tyr Leu Ser His Gln
1760 1765 1770

Leu Arg Leu Phe Gly Val Asn Ser Thr Ser Cys Leu Lys Ala Leu
1775 1780 1785

Glu Leu Ser Gln Ile Leu Met Arg Glu Val Lys Lys Asp Lys Asp
1790 1795 1800

Arg Leu Phe Leu Gly Glu Gly Ala Gly Ala Met Leu Ala Cys Tyr
1805 1810 1815

Asp Ala Thr Leu Gly Pro Ala Ile Asn Tyr Tyr Asn Ser Gly Leu
1820 1825 1830

Asn Ile Thr Asp Val Ile Gly Gln Arg Glu Leu Lys Ile Phe Pro
1835 1840 1845

Ser Glu Val Ser Leu Val Gly Lys Lys Leu Gly Asn Val Thr Gln
1850 1855 1860

Ile Leu Asn Arg Val Arg Val Leu Phe Asn Gly Asn Pro Asn Ser
1865 1870 1875

Thr Trp Ile Gly Asn Met Glu Cys Glu Ser Leu Ile Trp Ser Glu
1880 1885 1890

Leu Asn Asp Lys Ser Ile Gly Leu Val His Cys Asp Met Glu Gly
1895 1900 1905

Ala Ile Gly Lys Ser Glu Glu Thr Val Leu His Glu His Tyr Ser
1910 1915 1920

Ile Ile Arg Ile Thr Tyr Leu Ile Gly Asp Asp Asp Val Val Leu
1925 1930 1935

Val Ser Lys Ile Ile Pro Thr Ile Thr Pro Asn Trp Ser Lys Ile
1940 1945 1950

Leu Tyr Leu Tyr Lys Leu Tyr Trp Lys Asp Val Ser Val Val Ser
1955 1960 1965

Leu Lys Thr Ser Asn Pro Ala Ser Thr Glu Leu Tyr Leu Ile Ser
1970 1975 1980

Lys Asp Ala Tyr Cys Thr Val Met Glu Pro Ser Asn Leu Val Leu
1985 1990 1995

Ser Lys Leu Lys Arg Ile Ser Ser Ile Glu Glu Asn Asn Leu Leu
2000 2005 2010

Lys Trp Ile Ile Leu Ser Lys Arg Lys Asn Asn Glu Trp Leu Gln
2015 2020 2025

His Glu Ile Lys Glu Gly Glu Arg Asp Tyr Gly Ile Met Arg Pro
2030 2035 2040

Tyr His Thr Ala Leu Gln Ile Phe Gly Phe Gln Ile Asn Leu Asn
2045 2050 2055

His Leu Ala Arg Glu Phe Leu Ser Thr Pro Asp Leu Thr Asn Ile
2060 2065 2070

Asn Asn Ile Ile Gln Ser Phe Thr Arg Thr Ile Lys Asp Val Met
2075 2080 2085

Phe Glu Trp Val Asn Ile Thr His Asp Asn Lys Arg His Lys Leu
2090 2095 2100

Gly Gly Arg Tyr Asn Leu Phe Pro Leu Lys Asn Lys Gly Lys Leu
2105 2110 2115

Arg Leu Leu Ser Arg Arg Leu Val Leu Ser Trp Ile Ser Leu Ser
2120 2125 2130

Leu Ser Thr Arg Leu Leu Thr Gly Arg Phe Pro Asp Glu Lys Phe
2135 2140 2145

Glu Asn Arg Ala Gln Thr Gly Tyr Val Ser Leu Ala Asp Ile Asp
2150 2155 2160

Leu Glu Ser Leu Lys Leu Leu Ser Arg Asn Ile Val Lys Asn Tyr
2165 2170 2175

Lys Glu His Ile Gly Leu Ile Ser Tyr Trp Phe Leu Thr Lys Glu
2180 2185 2190

Val Lys Ile Leu Met Lys Leu Ile Gly Gly Val Lys Leu Leu Gly
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Ile Pro Lys Gln Tyr Lys Glu Leu Glu Asp Arg Ser Ser Gln Gly
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Tyr Glu Tyr Asp Asn Glu Phe Asp Ile Asp
2225 2230

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| ctattaatca agcactaagt gagagatttgg ggaatgaaga tattaatttgc tttccaaa | 11100 |
| atgcaatcag ctgtggaaattt agcataatga gtgttagtaga acaattaact ggttaggagtc | 11160 |
| caaaaacagtt agtttaataa cctcaattttt aagaaataga cattatgccca ccaccagtgt | 11220 |
| ttcaaggggaa attcaattttt aagcttagtag ataagataac ttctgtatcaa catatctca | 11280 |
| gtccagacaa aatagatatg ttaacactgg ggaaaatgct catgccact ataaaaggc | 11340 |
| agaaaaacaga tcagttccctg aacaagagag agaatttattt ccatggaaat aatcttatttgc | 11400 |
| agtctttgtc agcagcgtta gcatgtcatt ggtgtggat attaacagag caatgtatag | 11460 |
| aaaataatat tttcaagaaa gactgggtg acgggttcat atcggatcat gctttatgg | 11520 |

| | | | | | |
|------------------------|----------------------------------|--------------|-------------|------------|-------|
| acttcaaaat attccttatgt | gtctttaaaa ctaaactttt atgtagttgg | gggtcccaag | 11580 | | |
| ggaaaaacat taaagatgaa | gatatagttag atgaatcaat | agataaaactg | ttaaggattg | 11640 | |
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| taatgttata tgatgtaaaa | tttctatcat tagtaggtt | tatagggtt | aagaatttgt | 11760 | |
| ttatagaaca gttgagatca | gctgagttgc atgaggtacc | ttggattgtc | aatgccgaag | 11820 | |
| gtgatctgg | tgagatcaag tcaattaaaa | tctatttgc | actgatagag | caaagtttat | 11880 |
| ttttaagaat aactgtttt | aactatacag atatggcaca | tgctctcaca | agattaatca | 11940 | |
| gaaagaagtt gatgtgtgat | aatgcactat taactccgat | tccatcccc | atggttaatt | 12000 | |
| taactcaagt tattgatcct | acagaacaat tagtttattt | ccctaagata | acatttgaaa | 12060 | |
| ggctaaaaaaaaa | ttatgacact agttcaaatt | atgctaaagg | aaagctaaca | aggaattaca | 12120 |
| tgatactgtt | gccatggcaa catgttata | gatataactt | tgtctttagt | tctactggat | 12180 |
| gtaaagttag | tctaaaaaca tgcattggaa | aacttatgaa | agatctaaac | cctaaagttc | 12240 |
| tgtactttat | tggagaaggg gcagggaaatt | ggatggccag | aacagcatgt | gaatatcctg | 12300 |
| acatcaaatt | tgtatacaga agttaaaag | atgaccttga | tcatcattat | cctttggaat | 12360 |
| accagagagt | tataggagaa ttaagcagga | taatagatag | cggtaaggg | ctttcaatgg | 12420 |
| aaacaacaga | tgcaactcaa aaaactcatt | gggatttgat | acacagagta | agcaaagatg | 12480 |
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| taattctatg | gaggaaacat gtattatcat | gcagaatttg | cactacttat | gggacagacc | 12600 |
| tctattttat | cgcaaagtat catgctaaag | actgcaatgt | aaaattacct | tttttgtga | 12660 |
| gatcagtagc | caccttattt atgcaaggta | gtaaactgtc | aggctcagaa | tgctacatac | 12720 |
| tcttaacact | aggccaccac aacaatttac | cctgccatgg | agaaatacaa | aattctaaga | 12780 |
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| aagccaactg | taaatcactt ttatcagggc | taagaataacc | gataaataag | aaagaattaa | 12900 |
| atagacagag | aaggtttatta acactacaaa | gcaaccattc | ttctgttagca | acagttggag | 12960 |
| gtagcaaggt | catagagtct aaatggttaa | caaacaaggc | aaacacaata | attgatttgt | 13020 |
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| aaaatactta | ccctaataatg attaaactaa | tagataatct | aggaaatgca | gagataaaaa | 13140 |
| aactgatcaa | agtaactgga tatatgcttgc | taagtaaaaa | atgaaaaatg | ataaaaatga | 13200 |
| taaaataggt | gacaacttca tactattcca | aagtaatcat | ttgattatgc | aattatgtaa | 13260 |
| tagtttaatta | aaaactaaaaa atcaaaaagtt | agaaactaac | aactgtcatt | aagtttatta | 13320 |

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13350